THE CITY OF NORFOLK
PUBLIC WORKS

ADDENDUM NO. 2

Dated: June 17, 2016

LAFAYETTE BOULEVARD STREETSCAPE IMPROVEMENTS

Except as may be otherwise described, bidding requirements, materials, and workmanship for the work described herein shall conform to all requirements of the original Contract Documents. The following Addendum to the drawings and specifications are made a part of the project and takes precedence over the section of the specifications, in part, and/or drawings, as originally written.

This Addendum consists of one hundred (100) pages.

ITEM NO. **DESCRIPTION**

1. **TABLE OF CONTENTS; Page i**

Change: Section 01000 General Requirements, change 01000-16 to 01000-10

2. **INSTRUCTIONS TO BIDDERS; Page 1.2-3; Paragraph 8. TIME OF COMPLETION**

Change: One Hundred Twenty (120) to **One Hundred Eighty (180)**

3. **FORM OF BID; Page 1.3-1; Top of Page; Work to be Completed in:**

Change: 120 to **180**

FORM OF BID; Page 1.3-2; First Paragraph

Change: One Hundred Twenty (120) to **One Hundred Eighty (180)**

4. **CONTRACT; Page 1.4-1; ARTICLE 2 – DATE OF COMMENCEMENT AND COMPLETION TIMES**

Change: One Hundred Twenty (120) to **One Hundred Eighty (180)**
Change: One Hundred Fifty (150) to **Two Hundred Ten (210)**

5. **TECHNICAL SPECIFICATIONS**

Remove: Technical Specifications in their entirety.
Add: Technical Specifications from this Addendum.
Summary: There was an error in creating the PDF of the bid package.

5. Receipt of this addendum shall be acknowledged on page 1.3-1 of the Bid Form

Issued by: Toni Alvarez
Contract Monitoring Specialist

SECTION 01000

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 REFERENCE SPECIFICATIONS FOR STANDARDS

A. All referenced standards and specifications shall mean the latest edition, as of the date of these specifications, unless a specific issue is identified otherwise.

B. In the event that referenced specifications or standards contain general requirements in conflict with the General or Special Conditions, or the scope of work of individual sections of these specifications, the provisions of these specifications shall govern.

C. STANDARD OF DESIGN AND WORKMANSHIP: The intent of the specifications is to obtain for the OWNER first class workmanship in all respects. All components shall be manufactured, fabricated, assembled, and finished in accordance with the best of recognized trade standards. All materials shall be new and suitable for the conditions specified.

D. CODES AND STANDARDS

i. The Virginia Uniform Statewide Building Code shall be the basis for minimum requirements not otherwise specified.

ii. Standards and Specifications of the Department of Public Works, City of Norfolk, latest revision.

iii. Standards and Specification of the Department of Utilities of the City of Norfolk. Latest version.

iv. Virginia Department of Transportation (VDOT) Road and Bridge Standards, Dated 2007 unless otherwise noted.

v. The Virginia Erosion and Sediment Control Handbook, Third Edition, 1992

vi. The Federal Manual on Uniform Traffic Control Devices, Current Edition and the Virginia Supplement, latest revision.

vii. Hampton Roads Planning District Commission Regional Standards Fifth Edition, with Department of Utilities, City of Norfolk Modifications.

1.2 DRAWINGS AND SPECIFICATIONS; CONTRACTOR shall not scale for dimensions, but in case of lack of proper dimensions for drawings, shall request the OWNER's Representative to furnish same. In case of discrepancy in dimensions between the small and large-scale drawings, large-scale drawings shall have preference.

1.3 LAYING OUT THE WORK; A Virginia licensed surveyor shall layout the work, shall establish a permanent bench mark to which easy access may be had during the progress of the work, and shall determine all lines and grades as shown on the drawings. CONTRACTOR to provide cut sheets to the OWNER's representative prior to commencement of work.

1.4 MEASUREMENTS; Before ordering any material or doing any work, the CONTRACTOR and each SUB-CONTRACTOR shall verify all measurements and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of the difference between actual dimensions and measurements indicated on the drawings. Any difference, which may be found, shall be submitted to the OWNER's Representative for consideration before proceeding with the work

1.5 PERMITS, FEES AND NOTICES; The CONTRACTOR will initiate application and pay all fees including building permit, water meter and utility connections for water and sanitary, gas service and meter. The OWNER will initiate application and pay fees regarding the permanent electrical service to and including the transformer.

1.6 SANITARY ARRANGEMENTS; The CONTRACTOR shall provide on or near the premises suitable temporary sanitary conveniences and enclosures for the use of the workmen, shall maintain them in a sanitary condition, and shall remove same when directed by the OWNER. The OWNER shall approve the location of any temporary facilities. The CONTRACTOR shall not use existing facilities without prior arrangement with and approval by the OWNER.

1.7 WATER SUPPLY; The CONTRACTOR shall provide and pay for all water required in the work, including all means of conveying it to the places where required.

1.8 ELECTRICAL ENERGY; The CONTRACTOR shall pay all fees, obtain necessary permits and have meter installed for temporary power and light as may be required in the prosecution of the work.

1.9 FIELD ENGINEERING AND SURVEYING; The CONTRACTOR is responsible for all field engineering and surveying required completing any project. The cost for all field engineering and surveying will be included in the bid price of the contract and no additional compensation will be made.

1.10 COMMENCEMENT OF WORK

Upon written Notice to Proceed, the CONTRACTOR must commence work on the project within 10 days of the dates specified in the Notice to Proceed letter and work continuously each day, Monday through Saturday until the project is complete, weather permitting. Liquidated damages in the amount of $500.00 per day will be assessed against the CONTRACTOR for each and every day said CONTRACTOR does not work or days past due dates beginning 10 days after notice to proceed excluding legal holidays. Weather conditions will be determined by the Director of Public Works or his designee. All liquidated damages will be deducted from the project payment due the CONTRACTOR.

1.11 FINAL INSPECTION

Upon completion of a project, the CONTRACTOR shall request a final inspection in writing. The City has ten (10) working days from the receipt of the written request to perform the final inspection. The City has five (5) working days after the final inspection to notify the CONTRACTOR in writing of all discrepancies noted during the final inspection. The CONTRACTOR will commence work and work continuously until all discrepancies are corrected. The CONTRACTOR will be subjected to the liquidated damages as stated above.

1.12 MAINTENANCE OF ACCESS

The continued access of businesses and residences within the project area is of particular interest to the City. The City wishes not to discourage the patronage of these businesses or impede access to residences during construction. It is the intent of this contract for the CONTRACTOR to promote, as much as possible, a clean and orderly environment in the project area.

The CONTRACTOR shall maintain ingress to and egress from all businesses and residences during construction at no additional cost to the project.

1.13 CONTRACT DOCUMENTS

The CONTRACTOR will have as copy of the contract documents and the contract special provisions on the project site at all times.

1.14 EROSION AND SEDIMENT CONTROL

A. Unless otherwise indicated, all vegetative and structural erosion and sediment control practices will be constructed and maintained according to minimum standards and specifications of the Virginia Erosion and Sediment Control Handbook (latest edition) and the City of Norfolk erosion and sediment control ordinance.

B. The CONTRACTOR shall contact the City of Norfolk, Bureau of Environmental Services (664-4368) at least 48 hours prior the any land disturbing activity so that a preconstruction conference can be scheduled.

C. The CONTRACTOR shall apply permanent or temporary soil stabilization to all denuded or disturbed areas within seven (7) days after final grade is reached on any portion of the site. Soil stabilization must also be applied to denuded or disturbed areas which may not be at final grade but which will remain undisturbed for longer than 30 days. Soil stabilization measures include vegetative establishment, mulching and the early application of gravel base material on areas to be paved.

D. All erosion and sediment control measures are to be placed prior to or as the first step in construction.

E. The CONTRACTOR shall inspect all erosion control measures periodically and after each runoff producing rainfall event. Any necessary repairs to maintain the effectiveness of the erosion control services and cleanup of sedimentation are the responsibility of the CONTRACTOR and shall be made immediately.

F. Temporary erosion and sediment control measures are not to be removed until all disturbed areas are stabilized. After stabilization is complete, all temporary measures shall be removed within 30 days. Trapped sediment shall be spread and seeded.

G. The cost of Erosion and Sediment Control will be included in the unit bid prices of the contract.

H. The erosion and sediment control items mentioned here shall supersede erosion and sediment control notes in the supplemental general conditions.

1.15 TRAFFIC CONTROL

The CONTRACTOR shall provide and maintain, as required, all necessary traffic control in accordance with the Federal Manual on Uniform Traffic Control Devices, latest edition, and the Virginia Supplement, latest edition. The CONTRACTOR shall obtain a right-of-way work permit from the Division of Transportation before commencing any work in the right-of-way. Please see the *Maintenance of Traffic Plan*, Sheets CT-8.0, CT-8.1, CT-8.2 and CT-8.3 for permissible hours of operation and required sequence of construction.

Payment for traffic control devices will be made through and including the date of the final inspection. However, all traffic control devices will remain on the project and will be maintained by the CONTRACTOR until the City accepts the project.

1.16 MATERIALS & CONSTRUCTION METHODS

1. All materials will conform to the following unless otherwise specified on the project plans or in a written letter from the Director of Public Works or his designee. Unless otherwise stated, all referenced specifications will conform to the VDOT Road and Bridge Specifications, latest edition.

1.17 TESTING

1. The City may, at any time and at its discretion, require testing to ensure compliance with the specifications of the contract.

2. A recognized testing laboratory selected by the City, qualified in the field of materials to be tested, will perform all tests.

3. If applicable, all tests will be conducted in accordance with the VDOT Manual for Virginia Test Methods, current edition.

4. Payment for all tests performed will be in accordance with the following:

    1. The cost of all tests failing to meet minimum requirements will be borne by the CONTRACTOR.

    2. The cost of all tests that either meet or exceed minimum requirements will be borne by the City.

PART 2 (Not Applicable)

PART 3 - MEASUREMENTS AND PAYMENT

Measurement and payment for "Lafayette Boulevard Streetscape Improvements", shall be in accordance with the following, and the unit price bid shall constitute full payment for all equipment, labor, materials, tools, excavation, hauling, dewatering, disposal, and all incidentals necessary to complete the work as specified. Unless otherwise noted, all bid items shall be measured with plan quantities. For plan quantity overruns, bid items shall be measured and paid at the contract unit cost as approved by the OWNER.

1. ITEM 1, "MOBILIZATION/DEMOBILIZATION", shall include measurement and payment as a lump sum price. This includes incidentals such as bond, insurance, temporary facilities, coordination with private utility relocations, etc. Sixty percent (60%) of the lump sum price will be paid to the CONTRACTOR upon completion of his mobilization at the work site. The remaining forty percent (40%) will be paid to the CONTRACTOR upon completion of demobilization. In the event the OWNER considers that the amount in this item, sixty percent (60%) which represents mobilization and forty percent (40%) which represents demobilization, does not bear a reasonable relation to the cost of the work in this contract, the OWNER may require the CONTRACTOR to produce cost data to justify this portion of the bid. Failure to justify such price to the satisfaction of the OWNER will result in payment of actual mobilization costs, as determined by the OWNER, at the completion of mobilization, and actual demobilization costs, as determined by the OWNER, at the completion of demobilization. The determination of the OWNER is not subject to appeal.

2. ITEM 2, "CONSTRUCTION SURVEYING", The CONTRACTOR shall provide a lump sum price for furnishing, installing and maintaining all survey controls for all project improvements as shown on the plans, details, and specifications.

3. ITEM 3, "TRAFFIC CONTROL", shall be paid for as a lump sum. No additional measurement will be made for incidentals including labor, materials, and equipment required for installation, movement, and constant maintenance of both vehicular and pedestrian traffic during the entire contract period. All traffic control will be in according to the Manual of Uniform Traffic Control Devices, The Virginia Work Area Protection Manual, and the City of Norfolk Standards per the CONTRACTOR's submitted and approved traffic control plan. The cost of providing and maintaining temporary and permanent ADA Compliant Pedestrian and Delivery Access to all building entrances shall be included in this item. This includes all materials (additional stone, storm matting, etc.), labor, and equipment required for providing and maintaining temporary and permanent ingress/egress.

4. ITEM 4, "EROSION AND SEDIMENT CONTROL" - The CONTRACTOR shall provide a lump sum price to furnish, installing and maintaining all erosion and sediment controls measures that shall include, but not limited to; Silt Fence (SF), Inlet Protection (IP), Tree Protection (TP), Outlet Protection (OP) as shown on the plans, details and specifications identified as "Erosion and Sediment Control."

5. ITEM 5, "DEMOLITION OF CONCRETE SIDEWALK/ENTRANCE" - The CONTRACTOR shall provide a unit price per square yard to provide all labor, equipment and materials to remove and dispose of existing concrete sidewalks and entrances as shown on the plans, details, and specifications.

6. ITEM 6, "DEMOLITION OF CURB" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to remove and dispose of existing concrete curbing as shown on the plans, details, and specifications.

7. ITEM 7, "DEMOLITION OF CURB AND GUTTER" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to remove and dispose of existing concrete curb and gutter as shown on the plans, details, and specifications.

8. ITEM 8, "DEMOLITION OF 2" PAVEMENT MILLING" – The CONTRACTOR shall provide a unit price per square yard to provide all labor, equipment and materials to remove and dispose of existing 2" (minimum) pavement milling as shown on the plans, details, and specifications.

9. ITEM 9, "DEMOLITION OF ASPHALT PAVEMENT" - The CONTRACTOR shall provide a unit price per square yard to provide all labor, equipment and materials to remove and dispose of existing asphalt pavement and subbase as shown on the plans, details, and specifications.

10. ITEM 10, "DEMOLITION OF RIM ADJUSTMENT" - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to adjust the rim of the existing structures to the required elevation as shown on the plans, details, and specifications.

11. ITEM 11, "CONVERT DROP INLET TO MANHOLE" - The CONTRACTOR shall provide a lump sum price to provide all labor, equipment and materials to convert existing drop inlet to a manhole as shown on the plans, details, and specifications.

12. ITEM 12, "PAVEMENT MARKINGS - PAVEMENT MARKING - 4" SOLID LINE (COLOR: WHITE)" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

13. ITEM 13, "PAVEMENT MARKING - 4" SOLID LINE (COLOR: YELLOW)" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications. Contractor shall include in this unit price the quantity to install the outline of the gore markings as shown on the plans.

14. ITEM 14, "PAVEMENT MARKING - 6" SOLID LINE (COLOR: WHITE)" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

15. ITEM 15, "PAVEMENT MARKING - 6" MINI SKIP LINE (COLOR: WHITE)" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

16. ITEM 16, "PAVEMENT MARKING - 12" SOLID LINE (COLOR: WHITE)" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications. Contractor shall include in this unit price the quantity to install the two (2) foot wide stop bars, the gore markings, and the cross walks as shown on the plans.

17. ITEM 17, "PAVEMENT MARKING - 12" SOLID LINE (COLOR: YELLOW)" - The CONTRACTOR shall provide a unit price per linear foot to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications. Contractor shall include in this unit price the quantity to install the gore markings as shown on the plans.

18. ITEM 18, "PAVEMENT MARKING - DIRECTIONAL LEGEND (COLOR: WHITE)" - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

19. ITEM 19, "PAVEMENT MARKING - BIKE LEGEND (COLOR: WHITE)" - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

20. ITEM 20, “PAVEMENT MARKING - SHARROWS "DOUBLE CHEVRON" (COLOR: WHITE)” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

21. ITEM 21, “PAVEMENT MARKING - "ONLY" LEGEND (COLOR: WHITE)” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

22. ITEM 22, “PAVEMENT MARKING - "LOADING ZONE" MESSAGE (COLOR: WHITE)” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install thermoplastic pavement markings as shown on the plans, details and specifications.

23. ITEM 23, “LANDSCAPING - SWAMP CHESNUT OAK TREE” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install the specified landscaping as shown on the plans, details and specifications.

24. ITEM 24, “MUSKOGEE CRAPE MYRTLE TREE” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install the specified landscaping as shown on the plans, details and specifications.

25. ITEM 25, “RELOCATION OF SIGN” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to relocate the sign as shown on the plans, details and specifications.

26. ITEM 26, “RELOCATION OF BANNER POLE” – The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to relocate the banner poles as shown on the plans, details and specifications.

27. ITEM 27, “TRAFFIC SIGN” - The CONTRACTOR shall provide a unit price to provide all labor, equipment and materials to install the traffic sign as shown on the plans, details and specifications.

28. ITEM 28, “VDOT CG-2 CURB” - The CONTRACTOR shall provide a unit price measured per linear foot complete in place to provide all labor, equipment and materials to install VDOT CG-2 curb as shown on the plans, details, and specifications. The stone base utilized under curb and gutter will be included in the cost for this item.

29. ITEM 29, “MOD. VDOT CG-6 CURB AND 1.5’ GUTTER” - The CONTRACTOR shall provide a unit price measured per linear foot complete in place to provide all labor, equipment and materials to install concrete curb and gutter as shown on the plans, details, and specifications. The stone base utilized under curb and gutter will be included in the cost for this item.

30. ITEM 30, “NORFOLK HS-206 CONCRETE SIDEWALK” - The CONTRACTOR shall provide a unit price measured in square yards to provide all labor, equipment and

materials to place the concrete sidewalk as shown on the plans, details and specifications.

31. ITEM 31, "VDOT CG-12 RAMP" - The CONTRACTOR shall provide a unit price measured per ramp to provide all labor, equipment and materials required to place the VDOT CG-12 ramp as shown on the plans, details and specifications.

32. ITEM 32, "HYDRODYNAMIC SEPARATOR" - The CONTRACTOR shall provide a lump sum price to provide all labor, equipment and materials required to install the hydrodynamic separator as shown on the plans, details and specifications. Price should include all demolition (roadway, existing RCP, etc.) and any required restoration and installation of new 15" RCP as shown on the plans and specifications.

33. ITEM 33, "PEDESTRIAN CROSSING GRATE" - The CONTRACTOR shall provide a lump sum price to provide all labor, equipment and materials required to place the pedestrian crossing grate as shown on the plans, details and specifications.

34. ITEM 34, "HS-207 CONCRETE DRIVEWAY" - The CONTRACTOR shall provide a unit price measured in square yards to provide all labor, equipment and materials required to place the concrete driveway as shown on the plans, details and specifications.

35. ITEM 35, "2" SM-9.5A ASPHALT PAVEMENT (SURFACE)" - The CONTRACTOR shall provide a unit price measured in tons to provide all labor, equipment and materials required to place the asphalt pavement as shown on the plans, details and specifications.

36. ITEM 36, "4"BM-25 ASPHALT PAVEMENT (BASE)" - The CONTRACTOR shall provide a unit price measured in tons to provide all labor, equipment and materials to place the asphalt pavement base as shown on the plans, details, and specifications.

37. ITEM 37, "8" 21-B AGGREGATE" - The CONTRACTOR shall provide a unit price measured in square yards to provide all labor, equipment and materials place the aggregate base material as shown on the plans, details and specifications.

38. ITEM 38, "TOPSOIL (4" MIN.)" - The CONTRACTOR shall provide a unit price per square yard to provide all labor, equipment and materials needed to install topsoil to all disturbed pervious areas and new medians as shown on the plans, details, and specifications.

39. ITEM 39, "FINE GRADING, SEEDING, LIME AND FERTILIZER" - The CONTRACTOR shall provide a lump sum to provide all labor, equipment and materials needed to install and perform fine grading, seeding, lime, and, fertilizer to all areas disturbed due to clearing and grubbing as shown on the plans, details, and specifications.

40. ITEM 40, "UNSUITABLE MATERIAL (EXPORT)" - Unsuitable Material shall be measured in cubic yards based on actual quantities of unsuitable material excavated. The unit price shall include all labor, materials and equipment to excavate unsuitable material as directed by the OWNER's representative. The volume used for payment shall be determined by the OWNER's representative for in-place, compacted cubic yards of soil excavated/filled. Field quantities above that are listed in the Schedule of Prices will not

be considered for additional compensation unless approved by the OWNER's representative or classified as undercut excavation as described in the technical specifications. Unsuitable material below the grading plane in excavation areas that is determined by the OWNER or OWNER's representative to be unsuitable for the planned use shall be excavated and disposed of or stabilized as directed or approved by the OWNER or OWNER's representative

When unsuitable material is removed and disposed of, the resulting space shall be filled with material suitable for the planned use and as defined in the technical specifications. Such suitable material shall be placed and compacted

41. ITEM 41, "SELECT FILL (IMPORT)" - Measurement for this item shall be measured in cubic yards based on plan quantities for select fill. For plan quantity overruns, select fill shall be measured and paid at the contract unit cost as approved by the OWNER. The CONTRACTOR shall provide delivery tickets to the OWNER on a daily basis. Tickets not submitted the day of delivery will not be used in justification of quantity overruns.

    The OWNER shall approve select fill such as borrow sand or other common granular fill hauled to the job site for use. A delivery ticket shall accompany each load of select backfill material. Each ticket will be serially numbered, list the company supplying the fill material, truck number of trucks delivering material, date, size of load, and the project where delivered. In the event a material delivery ticket and delivery do not correspond, the OWNER may refuse the delivery and / or payment until such conditions are corrected to the satisfaction of the OWNER.

END OF SECTION 01000

SECTION 01300

SHOP DRAWINGS AND SUBMITTALS

PART 1 - GENERAL

1.1 GENERAL

A. The Contractor shall provide shop drawings, samples and catalog data as specified.

B. ITEMS NOT INCLUDED IN SHOP DRAWINGS: Shop drawings shall include all pertinent data required for the proper fabrication and installation of the materials specified.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SHOP DRAWINGS

A. Original Submittal. One reproducible copy and five copies of all shop drawings shall be submitted for approval in ample time to coordinate necessary features of construction with all fabrication and installation requirements. Not less than fifteen working days shall be allowed to permit checking and appropriate action.

B. Resubmittal. When a resubmittal is required, one print so indicating will be returned to the Contractor. After revision of the original, a new reproducible and three copies shall be submitted for approval.

3.2 SAMPLES

A. Original Submittal. Two samples, unless otherwise specified, of each item for which samples are required shall be furnished for approval. Approval shall be obtained prior to delivery of the material to the project site. Such samples shall be representative of the actual material proposed for use in the project and of sufficient size to demonstrate design, color, texture, and finish when these attributes will be exposed to view in the finished work.

B. Resubmittals. All rejected samples will be returned upon request, and any or all resubmittals required shall consist of two new samples.

3.3 CATALOG DATA

A. Submittals. Four copies of catalog data are required for the original submittal and each subsequent resubmittal that may become necessary. Catalog data shall be submitted along with shop drawings. Two copies will be returned as noted.

B. Catalog Data

1. Catalogs or brochures submitted containing multiple items for approval need identification only on the exterior. In such instances the identification shall include page and catalog numbers of items which are submitted for approval.

2. In the event that one or more of the multiple items are not approved in any submittal, additional copies will be required until all items are approved.

3.4 CONTRACTOR'S RESPONSIBILITY

A. Representation. By his submittal of any shop drawings or catalog data, the Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and similar data, or will do so, and that he has checked and coordinated each item with other applicable approved shop drawings and the contract requirements.

B. Deviations. Approval of shop drawings, samples, or catalog data by the Owner shall not authorize any deviation from the requirements of the contract documents.

END OF SECTION 01300

sSECTION 01700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. DEFINITIONS:

Project closeout is the term used to describe certain collective project requirements, indicating completion of the Work that are to be fulfilled near the end of the Contract time in preparation for final acceptance and occupancy of the Work by the Owner, as well as final payment to the Contractor and the normal termination of the Contract. Specific requirements for individual units of work are included in the appropriate sections in Division 2 through 16.

1.2 PREREQUISITES TO SUBSTANTIAL COMPLETION

A. General: Complete the following before requesting the Owner's inspection for certification of substantial completion, for the entire Work.

1. Prepare and submit to the Owner a list for approval of items remaining to be completed in accordance with General Conditions, the value of incomplete work, and reasons for the Work being incomplete. Items listed on the punch list will be directly coordinated with the Owner’s representative to ensure a complete and accurate list.

2. Obtain and submit releases enabling the Owner's full, unrestricted use of the work and access to services and utilities. Where required, include occupancy permits, operating certificates and similar releases.

3. Touch-up and otherwise repair and restore marred exposed finishes.

4. Complete final cleaning up requirements, including touch-up painting of marred surfaces.

5. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, final certifications and similar documents.

B. Upon receipt of the contractors list and request for Owner's verification, the Owner will either proceed with verification inspection or advise the Contractor of unfilled prerequisites.

1. Following initial verification inspection the Owner will either prepare a certificate of substantial completion, or will advise the Contractor of work which must be performed before the certificate will be issued. The Owner will repeat the inspection when requested, but only when assured that the work has been substantially completed.

2. Results of the completed inspection will form the initial "punch-list" for final acceptance.

1.3 PREREQUISITES TO THE FINAL ACCEPTANCE

A. General: Complete the following before requesting the Owner's final inspection for certification of final acceptance, and final payment as required by the General Conditions. List known exceptions, if any, in the request.

1. Submit Record Documents on a monthly basis with application for payment.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Owner's final punch-list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.

4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

5. Submit an As-Built Plan showing deviations from the contract drawings neatly hand-marked in red ink.

1.4 WARRANTY

A. A period of one year shall be established for all guarantees and warranties required by the contract specifications unless a longer period is specified. The installation and each item of equipment and material shall be guaranteed by the Contractor, and the equipment and material shall be warranted by the supplier and manufacturer.

B. The guarantee and warranty period for all items, unless specifically listed otherwise, shall commence on the date of the Certificate of Substantial completion certified by the Owner's representative.

C. In all cases, prior to beginning of the warranty period, equipment that has been used for any reason whatsoever shall be placed in first class operating condition.

D. The extent of a guarantee and warranty shall be the requirement to repair or replace, without cost to the Owner, all equipment or workmanship which shall be found to be defective during the guaranteed period, exclusive of repairs due to improper maintenance or operation, or to normal wear, tear and usage, and to pay for all damage resulting from defects.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01700

SECTION 01710

CLEANING

PART 1 - GENERAL

1.1 SCOPE: Provide all labor and materials to fully and properly complete the work indicated on the drawings and/or specified. Unless otherwise specified this work includes cleaning during and at the completion of the project. General cleaning during regular progress of work is required by the General Conditions.

1.2 RELATED WORK SPECIFIED ELSEWHERE: Cleaning-up required for specific trades or work is specified in section pertaining to that trade or work.

1.3 REQUIREMENTS OF REGULATORY AGENCIES:

A. Safety and Insurance Standards: Maintain project in accordance with all applicable Federal, State and Local codes and ordinances and in accordance with any applicable insurance company regulations or standards.

B. Fire Protection: Store volatile waste in covered metal containers and remove from premises daily.

C. Pollution Control: Conduct clean-up and disposal operations to comply with local ordinances and anti-pollution laws.

D. Burning or burying of rubbish and waste materials on the project site is not permitted.

E. Disposal of volatile fluid wastes (such as mineral spirits, oils, paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS: Use only cleaning materials recommended by manufacturer of surface to be cleaned and cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1 DURING CONSTRUCTION

A. Ensure that the work-site is maintained free from accumulations of waste materials and rubbish.

B. Sprinkle dusty debris with water.

C. Provide on site containers for collection of waste materials, rubbish and debris.

D. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.

E. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.

F. The Contractor is responsible for the removal of all paint and marks on the concrete and concrete pavers which are caused by the Contractor or by others, such as utility companies marking lines for Miss Utility, graffiti, or other. A method of removal must be approved by the Owner.

G. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on recently prepared surfaces.

3.2 FINAL CLEANING

A. Use experienced workmen for final cleaning.

B. At completion of construction and just prior to acceptance, conduct a final inspection of exposed surfaces.

C. Remove grease, dust dirt, stains, labels, fingerprints and other foreign materials from surfaces.

D. Repair, patch and touch-up marred surfaces to match adjacent finishes.

E. Broom clean paved surfaces; rake clean other surfaces of grounds.

3.3 All cleaning as required by the Owner and as specified in these Contract documents shall not be measured and paid. All manpower, work, equipment and incidentals necessary to complete the cleaning shall be considered incidental for the contract.

END OF SECTION 01710

SECTION 02000

SEQUENCE OF CONSTRUCTION

PART 1 - GENERAL

1.1 The Contractor shall coordinate and develop a Sequence of Construction Plan to be submitted to the City at the preconstruction conference. The Contractor shall sequence his construction to incorporate, but not be limited to, the items contained below.

1.2 Existing water, sanitary facilities, drainage and lighting shall be maintained by the Contractor during construction and until the proposed items have been properly connected and tested by the Contractor and approved by the Owner's representative.

1.3 The Contractor shall install utility services in a continuous manner that will cause the least disruption to system users.

1.4 Contractor shall maintain pedestrian access along Lafayette Boulevard and all side streets including access to all parcels.

1.5 Submittals

A. The Contractor shall submit a detailed plan describing materials and procedures utilized to maintain temporary and permanent ADA Compliant Pedestrian and delivery access at all times through all phases of demolition and construction.

B. The Contractor shall submit a detailed construction schedule using the critical path method showing all critical milestones for the project. Please see the Maintenance of Traffic Plan, Sheet CT-8.1 that identifies the *Temporary Traffic Control Phases* required for this project.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 The Contractor shall protect pedestrians by delineating walkways and preventing pedestrian access from areas under construction by utilizing Type I cones, snow fencing, or other approved barricades.

3.2 Sequence of construction shall not be measured and paid under this contract. All work associated with the specified sequence of construction shall be considered incidental to the Contract.

END OF SECTION 02000

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.1 Related work specified elsewhere includes the following:

A. Section 02000 - Sequence of Construction

B. Section 02730 – Storm Sewers

1.2 Description: Demolition shall be classified as the removal of all existing concrete sidewalks, pavers, concrete curb and gutter, roadway pavement, signage and lighting, water systems, sanitary sewer systems, storm drainage systems, and any necessary incidentals within the limits of the right-of-way and limits of demolition as indicated on the plans, required to complete the work specified.

1.3 Project Conditions

A. Explosives shall not be used.

B. Burning is not permitted.

1.4 The composition of the existing roadway is varied and may be concrete containing rebar and/or wire reinforcing.

PART 2 - PRODUCTS

2.1 Remove and store equipment or material designated to be reused on site, or at a location indicated herein, on the drawings, or by the Owner's Representative or Owner.

2.2 Remove and store equipment or material designated to remain the property of the Owner on site or at the location indicated herein or on the drawings.

2.3 Remove from the site and take possession of any equipment or material not designated to be reused or to remain the property of the Owner.

PART 3 - EXECUTION

3.1 Demolition Operations

1. The Contractor shall saw-cut existing concrete and asphalt between sections which are to be removed and adjacent sections which are to remain. All sawcuts shall be in a straight line or notched as appropriate to match doorway entrances and/or existing joints. Saw-cuts shall be 4-inch depth minimum to allow removal of the demolished section, yet leave a smooth surface joint when section is repaired.

2. Remove existing above-grade items including but not limited to posts, poles, fences, shrubs, and plants as specifically indicated or necessary to permit new construction. The Contractor shall coordinate the removal and/or replacement of such items with the Owner prior to beginning the demolition work.

3. When working on private or public property, the Contractor shall exercise caution so as to avoid damage to existing items that are to remain. Damage to existing items shall be repaired by the contractor to match existing condition or better at the Contractor's expense.

4. Where existing pipes are to be cut and abandoned for the installation of the proposed improvements, where designated on the drawings and as directed in the field, the Contractor shall plug both ends of the cut.

5. The area shall be wetted down thoroughly to prevent dust and dirt from rising.

6. The existing trees identified to remain are very sensitive to construction activity and shall be protected. The Contractor shall demolish the existing entrances and sidewalk behind the trees and within the limits of the drip lines only by jackhammer and removal of the debris shall only be by hand.

3.2 Underground Utilities

1. The Contractor shall exercise caution when working in areas of underground utilities. Underground utilities, as indicated on the drawings, are shown in the approximate location. Neither the Owner's Representative nor the Owner shall be held liable for any reason, for any omissions of underground utilities. The Contractor shall notify "Miss Utility" of Virginia, 811, to locate utilities before beginning any work.

2. Any removal or relocation of public utilities shall be coordinated with the Owner.

3. The Contractor shall maintain all existing flows for water and sanitary facilities. Any damages or disruption to water and sanitary services shall be repaired promptly and coordinated with the Department of Utilities. Contractor to provide by-pass pumping as required.

3.3 Cleanup

1. Debris resulting from demolition shall be cleaned up continuously with the progress of the work.

2. Debris will not be permitted to accumulate on the site. If the Contractor fails to remove excess debris promptly, the Owner reserves the right to remove it at the Contractor's expense.

3. Remove debris from site without spillage. Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

4. Salvage material that is to become property of the Contractor, and is not to be reused in construction, shall be removed within 10 days. Sale of material on the site is prohibited.

5. Remove all tools, equipment, material, and rubbish from the demolition upon completion of demolition.

6. Leave the site clean, neat, and orderly and in a condition to begin new construction.

7. The Contractor will be responsible for the removal of all debris and waste materials associated with this project to include but not be limited to; dirt, asphalt, broken concrete, and unsuitable material. The City dump will not be permitted to be used for any materials on this project. The Contractor shall identify waste areas to be used at the pre-construction meeting.

END OF SECTION 02050

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 WORK INCLUDED, BUT NOT LIMITED TO

A. Excavation, trenching, backfill, rough and finish grading, together with placement and preparation of topsoil for lawns and planting.

1.2 DEFINITIONS

A. Excavation: consists of removal of material encountered to subgrade elevations indicated. Material not to be reused shall be disposed of properly.

B. Subgrade: the undisturbed earth or the compacted soil layer immediately below structure or topsoil materials.

C. Unauthorized Excavation: consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Owner. Unauthorized excavation, as well as remedial work directed by the Owner, shall be at Contractor's expense.

D. Additional Excavation: When excavation has reached required subgrade elevations, notify Owner's Independent Testing Lab, who will make an inspection of conditions. If the testing lab determines that bearing materials at required subgrade elevations are unsuitable, continue excavation until suitable bearing materials are encountered and replace excavated material as directed by the testing lab with select backfill material. The contractor shall not remove or replace excavated material without written authorization from the owner or his special inspector. Removal of unsuitable materials and replacement with select materials shall be at the unit price as specified within the contract.

E. Any removal and disposal of unsatisfactory material as well as the replacement of select backfill shall be paid for at unit prices established in Schedule of Values.

1.3 QUALITY ASSURANCE

A. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Unless otherwise indicated comply with Virginia Department of Transportation (VDOT) Current Specifications and Standards for Road and Bridge Construction, latest edition.

1.4 SUBMITTALS

A. One optimum moisture-maximum density curve for each type of soil encountered will be

available from the site.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Locate existing underground utilities in areas of work.

B. Should uncharted or incorrectly charted utilities be encountered, consult Owner immediately for directions. Cooperate with Owner in keeping respective services and facilities in operation.

C. Repair damaged utilities to the satisfaction of utility company and Owner. Provide minimum 48-hour notice to the Owner and Utility Company prior to interruption of the utility. Contractor shall not proceed with utility interruption until receiving written notification to proceed.

D. Use of Explosives: The use of explosives is not permitted.

E. Protection of Persons and Property: Barricade open excavations and post warning signs and lights.

F. Operate warning lights as required by authorities having jurisdiction.

G. Protect all existing structures, utilities, sidewalks, pavements, lawns, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

H. Dust Control: Control dust on and near the Work, and on and near all off-site borrow areas. Thoroughly moisten all surfaces to prevent dust from being a nuisance to the public, and operation of existing facilities.

I. Pavement Cores: Provide in the specifications under ***Appendix A – Pavement Cores.*** The Contractor shall review this information prior to preparing his bid.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP. CL may be used as base fill in areas to be landscaped.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups ML,MH, CL, CH, OL, OH, and PT.

C. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 1/2 inches in any dimension (unless required by approved material gradation), debris, waste, frozen materials, vegetation and other deleterious matter.

D. Select Backfill: Satisfactory sandy soil materials having a soaked C.B.R. greater than or equal to 15.

E. Topsoil: See Section 02900, “Seeding”.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
B. Earth Excavation includes excavation of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.
C. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Owner.
D. Under footings, or foundation bases, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Drainage fill shall be used to bring elevations to proper position, when acceptable to Owner.
E. Contractor to strip and stockpile all existing topsoil within the areas designated for construction and/or grading. Stockpiles to be in areas designated on the plans, or as required by the Owner. Stockpiles to be in compliance with all erosion control specifications.

3.2 STABILITY OF EXCAVATIONS

A. General: Comply with local codes, ordinances, and requirements of agencies having jurisdiction.

B. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

C. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Extend shoring and bracing as excavation progresses.

D. Provide permanent steel sheet piling or pressure-creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops a minimum of 2'-6" below final grade and leave permanently in place.

3.3 DEWATERING

A. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

C. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

3.4 STORAGE OF EXCAVATED MATERIALS:

A. Stockpile excavated materials acceptable for backfill and fill where directed. Place, grade, and shape stockpiles for proper drainage.

B. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

C. Dispose of excess excavated soil material and materials not acceptable for use as backfill or fill.

3.5 EXCAVATION FOR STRUCTURES

A. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection.

B. Excavations for footings and foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

C. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, and other construction and for inspection. Do not disturb bottom of excavations, intended for bearing surface.

3.6 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Excavate trenches to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Excavate trenches and conduit to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

C. For pipes or conduit less than 6 inches in nominal size, and for flat-bottomed, multiple-duct conduit units, do not excavate beyond indicated depths. Hand-excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

D. For pipes and equipment 6 inches or larger in nominal size, shape bottom of trench to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Fill depressions with tamped sand backfill. At each pipe joint, dig bell holes to relieve pipe bell of loads to ensure continuous bearing of pipe barrel on bearing surface.

3.7 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.8 BACKFILL AND FILL

A General: Place soil material in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

B. Under grassed areas, use satisfactory borrow material. Do not use organic material to backfill the trench.

C. Under walks and pavements, use select backfill material as specified in Paragraph 2.1.D. Excavated or borrow material, or a combination of the two materials, that meets the requirements of these specifications is satisfactory material.

D. Under steps, use subbase material.

E. Under piping and conduit and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation. Shape excavation bottom to fit bottom 90 degrees of cylinder.

F. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.

G. Concrete is specified in Section 02500, “Paving, Surfacing, and Walks”.

H. Do not backfill trenches until tests and inspections have been made and backfilling is

authorized by Owner. Use care in backfilling to avoid damage or displacement of pipe systems.

I. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities have been performed and recorded.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
5. Removal of trash and debris from excavation.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.9 PLACEMENT AND COMPACTION

A. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

B. The surface of the exposed subgrade shall be inspected by probing or testing to check for pockets of soft or unsuitable material. Excavate as required to remove soft soil.

C, Care shall be exercised during the grading operations at the site. Combinations of excess surface moisture from precipitation and the traffic of heavy construction equipment may create "pumping" and a general deterioration of the bearing capabilities of the shallower soils. The grading should therefore be carried out during a dry season, if possible. Additional undercutting of the exposed Subgrade should be anticipated should the subgrade become saturated and worked by construction equipment. The contractor shall only expose subgrade areas in the parking lot area which can receive stone within 24 hours.

D. The exposed subgrade shall be well drained to prevent accumulation of water on the site. Limit construction traffic across the site such that traffic is within well defined areas.

E. Proofroll the surface of the exposed subgrade with a loaded tandem axle dump truck. Pockets of soft soil encountered which pump or will not properly compact under proofrolling, shall be removed and replaced with controlled fill. Replacement of subgrade with controlled fill shall be performed under the conditions of the contract. The contractor shall not excavate or replace unsuitable subgrade without written

authorization from the owner or his special inspector.

F. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

G. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

H. Control soil and fill compaction, providing minimum percentage of density specified for each area classification indicated below. Correct improperly compacted areas or lifts as directed by Owner if soil density tests indicate inadequate compaction.

1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density, in accordance with ASTM D 1557:

2. Under structures, slabs and steps, and pavements, compact top 6 inches of subgrade and each layer of backfill or fill material at 98 percent maximum density.

3. Under lawn or unpaved areas, compact top 6 inches of subgrade and each 12" layer of backfill or fill material at 90 percent maximum density.

4. Under walkways, compact top 6 inches of subgrade and each 12" layer of backfill or fill material at 95 percent maximum density.

I. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade or layer of soil material. Apply water in minimum quantity as necessary to prevent free water from appearing on surface during or subsequent to compaction operations.

J. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

K. Stockpile or spread soil material that has been removed because it is too wet to permit compaction. Assist drying by dicing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.10 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances,

compact with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10 foot above or below required subgrade elevations.

2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.05 foot above or 0.10 foot below required subgrade elevation.

B. Grading Surface of subgrade and backfill under pavements and Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10-foot straightedge.

C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.11 PAVEMENT AGGREGATE FILL

A. General: Aggregate fill consists of placement of stone material, in layers of indicated thickness, over subgrade surface to support asphalt pavement.

B. Placing: Place aggregate fill material on prepared subgrade, in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

C. When a compacted aggregate fill is indicated to be 6 inches thick or less, place material in single layer. When indicated to be more than 6 inches thick place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.12 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed.

B. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.

C. Field density tests may also be performed by the nuclear method in accordance with ASTM D 2922, providing that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. In conjunction with

each density calibration check, check the calibration curves furnished with the moisture gages in accordance with ASTM D 3017.

D. If field tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Owner.

E. Footing Subgrade: For each strata of soil on which footings will be placed, perform at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata when acceptable to Owner.

C. If in opinion of Owner, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

3.13 EROSION CONTROL

A. Provide erosion control methods in accordance with requirements of authorities having jurisdiction.

3.14 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible. All of the above to be done under the supervision of the Owner's independent testing laboratory.

3.15 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including unacceptable, or excess, excavated material, trash, and debris, and dispose of it off Owner's property, in a lawful manner.

END OF SECTION 02200

SECTION 02500

PAVING, SURFACING, AND WALKS

PART 1 - GENERAL

1.1 Related work specified elsewhere includes the following:

A. Section 02720 – Storm Sewers

1.2 Reference specifications where applicable to work under this Section are referred to by abbreviation as follows:

A. American Association of State Highway and Transportation Officials (AASHTO)

B. Virginia Department of Transportation (VDOT) Road and Bridge Specification, latest edition unless otherwise specified.

1.3 Establish and maintain required lines and elevations.

1.4 Apply tack coats only when ambient temperature is above 50 degrees, if and when temperature has not been below 35 degrees F for 12 hours immediately prior to application. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F and base is dry. Base course may be laid when temperature is above 30 degrees F and rising.

1.5 Concrete mixture for all concrete surfaces (curbs, walks, et c.) shall be from the same supplier. Mixture shall be of natural crushed river bed stone and light Portland Cement. Cement shall be from one source or mill. Mixture and color shall be approved by the Owner's Representative.

1.6 Contractor shall submit shop drawings indicating locations of expansion joints and control joints in concrete paving for approval by the Owner's Representative.

PART 2 - PRODUCTS

2.1 Aggregate base course shall be Type II, Size 21B or 22, graded aggregate base material as defined in VDOT, Road and Bridge Specifications, "Subbase and Aggregate Base Material".

2.2 Materials for use with asphalt concrete:

A. Tack coat shall be in accordance with VDOT Specifications, 2007 Asphalt Concrete Pavement

B. Asphalt concrete base course shall be VDOT BM-25D meeting requirements of VDOT

Road and Bridge Specifications, 2007, Section 211.

C. Asphalt concrete surface course shall be VDOT SM-9.5D meeting requirements of VDOT Road and Bridge Specifications, 2007, Section 211.

2.4 Concrete

A. Concrete base and/or base for utility pavement replacement shall be VDOT Specifications, Section 217, Class A3.

B. Concrete for exposed slabs shall be VDOT Specifications, Section 217, Class A-3, air-entrained.

D. Curing materials for concrete shall be clear and in accordance with VDOT Specifications, Section 220.

E. Joint materials shall be VDOT Specifications, Section 212. Expansion material shall be placed at all R/W line adjacent to buildings and or walls.

F. All concrete used for private property entrances shall "high-early" strength mix as approved by the Owner's Representative.

2.5 Select Material:

Select Material shall conform to VDOT specifications, Section 207.

2.6 Concrete joint Former:

A. "Kold-Seal" Zip-per Strip Extension Joint Former #KSF-400-38-50, distributed by Vinylex Corp., P. O. Box 7187, Knoxville, TN 37921, (615) 690-2211 or approved equivalent.

2.7 Pavement Striping

A. All pavement markings in the right-of way shall meet VDOT and City of Norfolk Specifications for thermoplastic line striping.

PART 3 - EXECUTION

3.1 Subgrade Preparation: Subgrade preparation shall consist of the final machining of the subgrade immediately prior to placing the aggregate base course. The surface shall be true to line and grade. Construction methods and equipment shall conform to applicable portions of Section 305 "Subgrade and Shoulders" of VDOT Road and Bridge Specifications.

3.2 Aggregate base course construction methods and equipment shall conform to requirements of Section 309, "Aggregate Base Course" VDOT Road and Bridge Specifications.

3.3 Asphalt Concrete Pavement Construction Methods shall conform to Section 315, "Asphalt Concrete Pavement" of VDOT Road and Bridge Specifications.

A. Apply tack coat to contact surfaces of previously constructed asphalt or Portland Cement concrete and surfaces abutting or projected into asphalt concrete pavement. Apply at rate of 0.10 gallon per square yard of surface in accordance with VDOT Road and Bridge Specification, Section 310, "Tack Coat.

3.4 Asphalt concrete overlay shall consist of Type SM-9.5D (VDOT 1987 Road and Bridge Specification) asphalt concrete, thickness as required to grade and tack coat. Placement of materials shall be as herein described.

3.5 Concrete walks shall be constructed in accordance with VDOT Specifications, Section 504 and as follows:

A. A test panel for each type of concrete section shall be poured for approval by the Owner prior to the remainder of placement of concrete walks on the project.

B. For curve formed concrete paving, tack concrete joint former to semi-rigid "bender board" or similar for use as an edge form. Remove board for adjacent pour, leaving concrete in place for use as an expansion joint.

C. Execution

1. Cement for the entire project should be the same type, brand and mix.
2. All aggregate, fine or coarse, should be from one source.
3. The mix design must remain constant.
4. Water of slump must remain constant. No water to be added at the site.
5. Clean the mixer before and after batching colored concrete.
6. Determine pigment amount by weight, not volume.
7. The transit mixer should operate at charging speed for 5 - 10 minutes after adding color.
8. Avoid calcium chloride.
9. Water reducing admixtures - determined by concrete producers.
10. Air entrainment admixtures - determined by concrete producers. Do not use carbon black pigment.
11. Minimize moving or spreading concrete. Do not over trowel.
12. Cement dusting, sprinkling or fogging of water not to be permitted.
13. Broom or texture finish required.
14. All joints shall be trowelled or expansion. Saw cutting joint patterns shall not be permitted under any circumstances.

3.6 Concrete entrances shall be Norfolk standard as shown unless otherwise indicated on drawings. Placement shall be in accordance with VDOT Specifications or the drawings. All concrete used for entrances shall be "high-early" strength concrete.

3.7 Curb and Gutter

A. Concrete curbs and gutters shall be Norfolk standards as shown, or as dimensioned on the plans, constructed in accordance with VDOT Specifications, Section 502. Curb wipe downs shall be constructed in accordance with the details shown on the plans.

B. Joints shall be in accordance with VDOT standards, except where walks adorn the curb. Where walks are adjacent to the curbs, curb joint pattern shall match the walk pattern with joints at minimum 10 feet on center.

3.8 Pavement for replacement over piping shall be in accordance with the plans and these specifications.

3.9 Pavement Repairs

1. Asphalt Concrete Pavement in areas outside of limits of overlay pavement replacement.

    1. When pavement must be cut, make the cut in a straight line, parallel to, and 12-inches wider than, trench on each side to provide an undisturbed shoulder under the new work.

    2. Where trenches cross streets, avoid placement of excavated material on existing pavement whenever possible. Clean the pavement by an approved method. Use no cleated equipment on pavements. Alter normal traffic flow only with permission from the Owner.

    3. Prepare subgrade as specified in “Subgrade Preparation”, paragraph above.

    4. Replace aggregate base course in layers not to exceed 6 inches in thickness to a depth in accordance with the details. In no case shall the replaced base be less than 6 inches thick.

    5. Replace asphalt concrete base and/or surface course in accordance with the details. All asphalt pavement repairs shall have a smooth edge at the transition to existing pavement.

2. Milling Existing Pavement

    1. In cases where milling of existing pavement is required to match grades of proposed and existing pavement; the following methods shall be used.

    2. Mill surface as required to match final grade with minimum 2" asphalt overlay.

    3. Apply tack coat and asphalt concrete overlay, SM-9.5D asphalt concrete, as described here and as specified in VDOT Section 315.

    4. Note that total milling depth may vary between 2"-8". Refer to plan sheets for

reference.

3. Concrete

1. When curb and gutter or sidewalks must be cut, make the cut at the nearest construction joint.

2. Restore private entrances (where outside limits of full improvements) to match original conditions or provide no less than 6 inches of aggregate base course, whichever condition is better.

3.11 Do not block private entrances except with permission of the Traffic Engineering Department and after notification to the property owner. Maintain ingress and egress to all properties at all times.

3.12 Do not clog street drainage. Maintain shoulders, gutters, and ditches affected by trenching operations to carry drainage flows.

3.13 Temporary Repairs

1. Where it is not feasible to replace pavements in streets or private driveways immediately after completion of the excavation and backfill, furnish and place crushed stone or gravel as required to maintain traffic until the pavement can be restored. Continuously maintain the temporary crushed stone or gravel surfaces in a smooth condition, free of holes, divots or ruts, until the permanent pavement is restored. Keep dust to a minimum by applying water. An asphalt cold patch may be used in temporary repairs at the discretion of the Owner.

3.14 Protection and Restoration

A. Side Walks

1. Protect completed walks from damage. Cover completed construction, subject to continued movement of installation personnel, equipment or materials, with plywood panels to protect paver alignment and prevent depressions.

2. Restore damaged walks as directed by the Owner's representative.

3. The Contractor shall install pavers per manufacturer's recommendations. Discrepancies between this specification and manufacturer's recommendation, if any, shall be resolved in advance of installation and agreed to by the Owner's representative.

3.16 Subgrade Preparation

1. The Contractor shall verify subgrade elevations and correct discrepancies before proceeding with construction.

2. The Contractor shall verify casting elevations and reset or adjust to meet flush with finished walk surface.
3. Base course shall not be placed on frozen or muddy subgrade.

END OF SECTION 02500

SECTION 02720

STORM SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

A. SUMMARY

i. Extent of storm sewage systems work is indicated on drawings and schedules, and by requirements of this section.

ii. Refer to Division-2 Section 02220 "Earthwork" for excavation and backfill required for storm sewage systems; not work of this section.

B. QUALITY ASSURANCE

i. Manufacturer's Qualifications: Firms regularly engaged in manufacture of storm sewage system's products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

ii. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with storm sewage work similar to that required for project.

C. CODES AND STANDARDS

i. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of storm sewage system's materials and products.

ii. Environmental Compliance: Comply with applicable portions of local Environmental Agency regulations pertaining to storm sewage systems.

iii. Install system in accordance with the City of Norfolk standards and specifications.

D. SUBMITTALS

i. Product Data: Submit manufacturer's technical product data and installation instructions for storm sewage system materials and products.

ii. Shop Drawings: Submit shop drawings for storm sewage systems, showing piping materials, size, locations, and inverts. Include details of underground structures, connections, and manholes.

iii. Record Drawings: At project closeout, submit record drawings of installed storm sewage piping and products, in accordance with requirements of Division 1.

iv. Maintenance Data: Submit maintenance data and parts lists for storm sewage system materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

2.1 PIPES AND PIPE FITTINGS

A. General: Provide pipes of one of the following materials, of weight/class indicated. Provide pipe fittings and accessories of same material and weight/class as pipes, with joining method as indicated.

B. Reinforced Concrete Pipe: A.A.S.T.O. M170 and ASTM C 76, Class III unless otherwise indicated.

C. All PVC Storm Drain shall be ASTM D-3034-74. Pipe 8" and Larger shall be SDR-35. Pipes 6" and Smaller shall be SDR-23.5.

D. Fittings: PVC, ASTM D3034, solvent cement joint complying with ASTM D2855 using solvent cement complying with ASTM D 2564; or elastomeric joints complying with ASTM D 3212 using elastomeric seals complying with ASTM F 477.

F. Butyl Joint Sealant: Use butyl joint sealant at joints of reinforced concrete pipe. Size of sealant shall be 3/4" for 12"-21" pipe diameter, 1" for 24"-36" pipe diameter, and 1-1/4" for 42"-48" pipe diameter.

2.2. STORM SEWER DROP INLETS

A. General: Provide City of Norfolk standard storm sewer drop inlets as indicated, in accordance with detail on the plans.

B. Top: Cast concrete, flat slab type, as indicated.

C. Base: Cast concrete, as indicated.

D. Frame and Grate Cover: Cast-iron, 30" square, heavy-duty, ASTM A-48 with frame weight 277 lbs. and cover weight 160 lbs.

E. Concrete Pipe Connection: Pipes shall be concrete grouted (min 8"thick) into wall.

F. Cement: High early strength American Portland Cement of well established and approved brands and shall conform to the latest Specifications of ASTM.

G. Brick: Brick shall be all hard No. 1 brick, manufactured of clay or shale of uniform standard commercial size with straight, parallel edges and square corners, burned uniformly hard entirely through, with uniform color and uniform abrasion specifications.

H. Sand: Clean and sharp, free from deleterious substances and contain not with strength test of 105 percent at 7 days and 28 days, and a color test of not more than two (2), as set out in the ASTM Specifications.

2.3. STORM SEWER CATCH BASINS

A. General: Provide VDOT standard storm sewer catch basins as indicated, in accordance with the detail on the plans.

B. Top: As indicated on the plans.

C. Base: Cast concrete, as indicated on the plans.

D. Top casting: As indicated on the plans.

E. Concrete Pipe Connection: Pipes shall be concrete grouted (min 8"thick) into wall.

F. Cement: High early strength American Portland Cement of well established and approved brands and shall conform to the latest Specifications of ASTM.

G. Brick: Brick shall be all hard No. 1 brick, manufactured of clay or shale of uniform standard commercial size with straight, parallel edges and square corners, burned uniformly hard entirely through, with uniform color and uniform abrasion specifications.

H. Sand: Clean and sharp, free from deleterious substances and contain not with strength test of 105 percent at 7 days and 28 days, and a color test of not more than two (2), as set out in the ASTM Specifications.

2.4 STORM SEWER MANHOLES

A. General: Provide VDOT standard storm drain manholes as indicated, in accordance with the detail on the plans.

B. Top: As indicated on the plans.

C. Base: Cast concrete, as indicated on the plans.

D. Top casting: As indicated on the plans.

E. Concrete Pipe Connection: Pipes shall be concrete grouted (min 8"thick) into wall.

F. Cement: High early strength American Portland Cement of well established and approved brands and shall conform to the latest Specifications of ASTM.

G. Brick: Brick shall be all hard No. 1 brick, manufactured of clay or shale of uniform standard commercial size with straight, parallel edges and square corners, burned uniformly hard entirely through, with uniform color and uniform abrasion specifications.

H. Sand: Clean and sharp, free from deleterious substances and contain not with strength test of 105 percent at 7 days and 28 days, and a color test of not more than two (2), as set out in the ASTM Specifications.

2.5 STORM SEWER JUNCTION BOXES

A. General: Provide VDOT standard storm sewer junction box as indicated, in accordance with the detail on the plans. Junction box shall be constructed to meet H-20 traffic loads rating.

B. Top: As indicated on the plans.

C. Base: Cast concrete, as indicated on the plans.

D. Top casting: As indicated on the plans.

E. Concrete Pipe Connection: Pipes shall be concrete grouted (min 8"thick) into wall.

F. Cement: High early strength American Portland Cement of well-established and approved brands and shall conform to the latest Specifications of ASTM.

2.6 STORMWATER TREATMENT DEVICE (HYDRODYNAMIC SEPARATOR)

A. GENERAL

i. This item shall govern the furnishing and installation of the CDS® by Contech Engineered Solutions LLC (or approved equal), complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

ii. The Contractor shall furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

iii. The manufacturer of the SWTD shall be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five (5) years and which have a history of successful production, acceptable to the Engineer.

iv. Related Sections

a. Section 02200: EARTHWORK

v. All components shall be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

vi. The manufacturer shall guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve (12) months from the date the components are delivered to the owner for installation. The manufacturer shall upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components shall be limited to the application for which it was specifically designed.

vii. The SWTD manufacturer shall submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification shall be supported by independent third-party research

viii. No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

B. MATERIALS

i. Housing unit of stormwater treatment device shall be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components shall conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

a. Concrete shall achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);
b. Unless otherwise noted, the precast concrete sections shall be designed to withstand lateral earth and AASHTO H-20 traffic loads;
c. Cement shall be Type III Portland Cement conforming to ASTM C 150;
d. Aggregates shall conform to ASTM C 33;
e. Reinforcing steel shall be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.
f. Joints shall be sealed with preformed joint sealing compound conforming to ASTM C 990.

g. Shipping of components shall not be initiated until a minimum compressive strength of 4,000 psi is attained or five (5) calendar days after fabrication has expired, whichever occurs first.
h. Internal Components and appurtenances shall conform to the following:
i. Screen and support structure shall be manufactured of Type 316 and 316L stainless steel conforming to ASTM F 1267-01;
j. Hardware shall be manufactured of Type 316 stainless steel conforming to ASTM A 320;
k. Fiberglass components shall conform to the ASTM D-4097
l. Access system(s) conform to the following:
m. Manhole castings shall be designed to withstand AASHTO H-20 loadings and manufactured of cast-iron conforming to ASTM A 48 Class 30.

C. PERFORMANCE

i. The SWTD shall be capable of achieving an 80% reduction of a particle size distribution having a mean particle size (d_{50}) of 125 microns unless otherwise stated.

ii. The SWTD shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 millimeters (mm) regardless of the pollutant's specific gravity (i.e.: floatable and neutrally buoyant materials) for flows up to the device's rated-treatment capacity. The SWTD shall be designed to retain all previously captured pollutants addressed by this subsection under all flow conditions. The SWTD shall be capable of capturing and retaining total petroleum hydrocarbons. The SWTD shall be capable of achieving a removal efficiency of 92 and 78 percent when the device is operating at 25 and 50 percent of its rated-treatment capacity. These removal efficiencies shall be based on independent third-party research for influent oil concentrations representative of storm water runoff (20 ± 5 mg/L). The SWTD shall be greater than 99 percent effective in controlling dry-weather accidental oil spills.

iii. The SWTD shall be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber shall be in accordance with the volume listed in Table 1. The boundaries of the sump chamber shall be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. The sump chamber shall be separate from the treatment processing portion(s) of the SWTD to minimize the probability of fine particle re-suspension. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber shall be 16 inches in diameter.

iv. The SWTD shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

v. The SWTD shall convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation shall be submitted that

demonstrates equal or better upstream hydraulic conditions compared to that specified herein. This documentation shall be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

vi. The SWTD shall have completed field tested following TARP Tier II protocol requirements.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPE AND PIPE FITTINGS

A. General: Install piping in accordance with manufacturer's specifications and governing authorities having jurisdiction, except where more stringent requirements are indicated.

B. Inspect piping before installation to detect apparent defects. Mark defective materials with white paint and promptly remove from site.

C. Lay piping beginning at low point of system, true to grades and alignment indicated, with unbroken continuity of invert.

D. Place bell ends or groove ends of piping facing upstream.

E. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.

F. Cleaning Piping: Clear interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull past each joint as it is completed.

i. In large, accessible piping, brushes and brooms may be used for cleaning.

ii. Place plugs in ends of uncompleted conduit at end of day or whenever work stops.

iii. Flush lines between manholes if required to remove collected debris.

G. Closing Abandoned Utilities: Close open ends of abandoned underground utilities which are indicated to remain in place. Provide sufficiently strong closures to withstand hydro-static or earth pressure which may result after ends of abandoned utilities have been closed.

i. Close open ends of concrete or masonry utilities with not less than 8" thick brick masonry bulkheads. For structures, ensure the plug is flush with the interior wall and structurally sound. For pipes, ensure plug is flush with end of pipe.

H. Interior Inspection: Inspect piping to determine whether line displacement or other damage has occurred.

i. Make inspections after lines between manholes, or manhole locations, have been installed and approximately 2' of backfill is in place, and again at completion of project.

ii. If inspection indicates poor alignment, debris, displaced pipe, infiltration or other defects, correct such defects, and re-inspect.

3.2 DROP INLETS

A. General: Construct drop inlets to sizes and shapes indicated. See details on plans.

B. Set frames and grates to elevations indicated. Prior to installation, clean all YB-1 grates thoroughly and paint only the grate Yellow Alkyd Traffic Paint #22691 as manufactured by Glidden Paint Co. or approved equal. Do not paint the collar.

C. Provide VDOT IS-1 inlet shaping to all drop inlets.

3.3 CATCH BASINS

A. General: Construct catch basins to size and shapes indicated. See details on plans.

B. Set casting to top of curb elevation indicated.

C. Provide VDOT IS-1 inlet shaping to all catch basins.

3.4 STORM SEWER MANHOLES

A. General: Construct manholes to size and shape indicated. See details on plans. Prior to installation, clean thoroughly the rims of all storm drain manholes located in grassed or landscaped areas and paint the rim only Yellow Alkyd Traffic Paint #22691 as manufactured by Glidden Paint Co. or approved equal.

B. Set frames and covers to elevations indicated.

C. Provide VDOT IS-1 inlet shaping to all manholes.

3.6 STORMWATER TREATMENT DEVICE

A. The contractor shall exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced shall be borne by the contractor.

B. The SWTD shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer shall provide the contractor installation instructions and offer on-site guidance during the important stages of the installation as identified by

the manufacturer at no additional expense. A minimum of 72 hours' notice shall be provided to the manufacturer prior to their performance of the services included under this subsection.

C. The contractor shall fill all voids associated with lifting provisions provided by the manufacturer. These voids shall be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor shall trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

D. The contractor shall removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

3.7 BACKFILLING

A. General: Conduct backfill operations of open-cut trenches closely following laying, jointing, and bedding of pipe, and after initial inspection and testing are completed. Backfilling, lifts, and compaction is to be in accordance with the details on the plans and specifications section 02200.

i. To minimize local area traffic interruptions, allow no more than 100' between pipe laying and point of complete backfilling.

3.8 FIELD QUALITY CONTROL

A. Testing: Perform testing of completed piping in accordance with local authorities having jurisdiction.

B. Cleaning: Once the storm drainage system has been completed, the contractor shall thoroughly clean all pipes and structures of siltation and debris and maintain erosion and sediment control measures to protect the system until the completion of construction.

END OF SECTION 02720

SECTION 329200 – TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Sodding.
3. Hydro-seeding
4. Erosion-control material(s).

B. Related Sections:

1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.
2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.
3. Division 32 Section "Porous Unit Paving" for concrete grid-type pavers shaped to provide open areas between units, planted with grass or other plants.
4. Division 32 Section "Planting Irrigation" for turf irrigation.
5. Division 32 Section "Plants" for any border edgings.
6. Division 33 Section "Subdrainage" for subsurface drainage.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

J. Landscaping Substantial Completion: Inspection by the City of Norfolk's - Department of Recreation, Parks, and Open Space, Division of Open Space Planning and Development, Landscape Architect to ensure that all work encompassing this specification section and the contract documents is satisfactory to the City of Norfolk. This inspection will precede the awarding of the project's substantial completion.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for turfgrass sod. Include identification of source and name and telephone number of supplier.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For standardized ASTM D 5268 topsoil existing native surface topsoil existing in-place surface soil and imported or manufactured topsoil. Copies of all testing results shall be submitted to the City of Norfolk's Forester & Landscape Architect, and to the designated Public Works site inspector.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required initial maintenance periods.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: For all turf/seed restoration work within the Right-of-Way OR less than 2,500-SF, the grass turf/seed installer and their Field Supervisor are NOT required to hold the memberships and Certifications from ANLA and Certified Turfgrass Professionals.

B. For all grass establishment work outside the Right-of-Way OR greater than 2,500-SF, the planting should be performed by a qualified landscape Installer whose work has resulted in successful turf and meadow establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

4. Personnel Certifications: Installer's field supervisor personnel assigned to the Work shall have certification in one of the following categories from the Professional Landcare Network:
   a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
   b. Certified Turfgrass Professional designated CTP.
   c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.
5. Pesticide Applicator: State licensed, commercial.

C. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

D. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall be given soil sampling data, with depth, location, and number of samples taken to adequately represent each soil type on project site. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.

   a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
   b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such

problem materials are present, provide additional recommendations for corrective action.

4. If soil testing does not meet particle size distribution, physical and/or chemical properties specified; the soil shall be adjusted and re-tested, or another source secured, tested, and submitted for approval.

E. Preinstallation Conference: Conduct conference at Project site; unless waived by all parties.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

C. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Seed Planting:
   a. Bermuda – Unhulled: September 1st – April 30th
   b. Bermuda – Hulled: May 1st – August 30th
   c. Fescue: September 15th – November 1st and April 1st – May 1st
   d. Tidal Areas:
2. Sod Installation/Planting: September 1st to April 30th at times when the ground temperature stays above 70 degrees Fahrenheit.
3. Hydro-seeding: ‘Savannah’ Bermuda

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 60 days from date of **Landscaping Substantial Completion**.

a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Sodded Turf: 60 days from date of **Landscaping Substantial Completion**.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

C. Seed Species: Seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed; refer to construction documents for appropriate seed type:
1. Full Sun: Bermuda.
a. 100% ‘Savannah’ Bermuda

2. Shade: Proportioned by weight as follows:

a. 50 percent chewings red fescue (Festuca rubra variety).
b. 35 percent rough bluegrass (Poa trivialis).
c. 15 percent redtop (Agrostis alba).

D. Seed Species: Upon approval, alternate seeds maybe acceptable to match existing conditions of the site or adjacent sites:
1. Submit request for approval of State-Certified alternate species.
2. Submit seed manufacture’s data on seed mix.

2.2 TURFGRASS SOD

A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Full Sun: Bermuda
   a. Sun and Partial Shade: 'Savannah' Bermuda

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.6 PLANTING SOILS

A. All soil mixing shall be performed at contractor’s yard using appropriate soil mixing and shredding equipment of sufficient capacity to assure proper quality control. No mixing of soils

shall occur at project location unless suitable portable equipment approved by the city forester & Landscape Architect is permitted. All soil testing shall be at the expense of the contractor:

B. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
   1. Soluble salt level: less than 844ppm.

   2. Ratio of Loose Compost to Topsoil by Volume: 1:2.
   3. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
   4. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
   5. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
   6. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
   7. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
   8. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
   9. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
   10. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
   11. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
   12. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

C. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

   1. Supplement with another specified planting soil when quantities are insufficient.
   2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

      a. Ratio of Loose Compost to Topsoil by Volume: 1:2.
      b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
      c. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
      d. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
      e. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
      f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
      g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
      h. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
      i. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
      j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
      k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

D. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and

other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Surface Soil by Volume: 1:2.
2. Ratio of Loose Sphagnum Peat to Surface Soil by Volume: per soil test recommendations.
3. Ratio of Loose Wood Derivatives to Surface Soil by Volume: per soil test recommendations.
4. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
5. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
8. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
9. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

E. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

    a. Ratio of Loose Compost to Topsoil by Volume: 1:2 per soil test recommendations.
    b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
    c. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
    d. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
    e. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
    f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
    g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.

h. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
i. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

2.8 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel,

paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 8 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.
    b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.

    a. Apply superphosphate fertilizer directly to surface soil before loosening.

3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.

C. Fill cells of erosion-control mat with planting soil and compact before planting.

D. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

E. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 8 lb/1000 sq. ft..

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.

F. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
2. Bond straw mulch by spraying with asphalt emulsion at a rate of 10 to 13 gal./1000 sq. ft.. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

G. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.6 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 4000-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
3. Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than 2000-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of 2000 lb/acre in opposing direction from the first application.

3.7 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade,

eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod parallel to contour with staggered vertical joints for slopes exceeding 1:3. In areas where sod may be displaced by foot traffic during sodding operations, ladders or treaded planks shall be used.
2. Anchor sod on slopes exceeding 1:6 with wood pegs that are at least 8" in length and have a cross-sectional area of approximately 1 square inch or steel staples, set flush with sod surface and spaced as required to adequately hold sod securely in place; but not less than 2 anchors per sod strip to prevent slippage. Special attention shall be given to anchoring sod placed in drainage ditches, channels, and swales.

C. Sodded areas shall be rolled or tamped to press the root system of the sod into full contact with underlying soil.

D. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

E. Sodded areas shall be kept watered to maintain the life and growth of the sod until final acceptance.

3.8 PLUGGING

A. Plant plugs in holes or furrows, spaced 12 inches apart in both directions. On slopes, contour furrows to near level.

3.9 SPRIGGING

A. Plant freshly shredded sod sprigs in furrows 1 to 1-1/2 inches deep. Place individual sprigs with roots and portions of stem in moistened soil, 6 inches apart in rows 10 inches apart, and fill furrows without covering growing tips. Lightly roll and firm soil around sprigs after planting.

B. Broadcast sprigs uniformly over prepared surface at a rate of 10 cu. ft./1000 sq. ft. and mechanically force sprigs into lightly moistened soil.

1. Spread a 1/4-inch- thick layer of compost mulch and planting soil on sprigs.
2. Lightly roll and firm soil around sprigs after planting.
3. Water sprigs immediately after planting and keep moist by frequent watering until well rooted.

3.10 TURF RENOVATION

A. Renovate existing turf.

B. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

C. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

D. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

E. Mow, dethatch, core aerate, and rake existing turf.

F. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

G. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

H. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

I. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

J. Apply seed and protect with straw mulch and sod as required for new turf.

K. Water newly planted areas and keep moist until new turf is established.

3.11 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from **contractor supplied sources** and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow Bermuda grass to a height of 1 1/2 to 2 inches.
2. Mow Kentucky bluegrass, annual ryegrass and chewings red fescue to a height of 1 1/2 to 2 inches.
3. Mow Fescue to a height of 3 – 3 1/2 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.12 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Owner:

1. Satisfactory Turf: All turf must be installed and have been **maintained a minimum of 60 days** prior to acceptance.
2. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
3. Satisfactory Sodded Turf: At end of maintenance period, a healthy, **well-rooted**, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
4. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as **well-rooted**, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
5. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as **well-rooted**, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.13 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.14 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period and approval/release by Owner's Erosion and Sediment Control Inspector.

PART 4 - INSPECTION AND ACCEPTANCE

4.1 LANDSCAPE SUBSTANTIAL COMPLETION

A. The contractor shall perform all necessary weeding, mowing and trimming, and shall replace sections larger than 1 square foot that are bare or otherwise damaged.

B. City of Norfolk - Department of Recreation, Parks, and Open Space, Division of Open Space Planning and Development**,** Division of Open Space Planning and Development's Landscape Architect shall inspect all work and materials for the Landscape Substantial Completion upon written request by the Contractor. The request shall be received at least ten (10) calendar days before the anticipated date of inspection and sent to **City of Norfolk - Department of Recreation, Parks, and Open Space, Division of Open Space Planning and Development, Attention: City Landscape Architect.**

C. Upon correction and/or replacement of all substandard work and materials by the Contractor, the Owner shall issue a **Project Certificate of Substantial Completion**. The responsibility for obtaining the overall **Project Certificate of Substantial Completion** rests with the Contractor. Progress payments may be withheld unless the Contractor obtains the **Project Certificate of Substantial Completion**.

D. The work may be accepted in parts when it is deemed to be in the Owner's best interest to do so, and when written approval is given to the Contractor to incrementally complete the work. Acceptance and use of such areas by the Owner shall not waive any of the provisions of this Contract.

4.2 LANDSCAPE INSPECTION, GUARANTEE AND REPLACEMENT

A. Landscape Inspection: Inspection of the work to determine its completion for beginning of the Landscape Guarantee and Maintenance Period will be made by the Owner upon request for such inspection submitted by the Contractor at least (10) days prior to the anticipated date. ALL SEEDED AREAS MUST BE ALIVE AND HEALTHY.

B. After inspection, the Owner will notify the Contractor of the date of the beginning of the Landscape Guarantee and Maintenance Period by issuing a notice of Acceptance, or in the event

of any deficiencies, of the requirements for beginning the Landscape Guarantee and Maintenance Period.

C. Landscape Guarantee and Replacement: All seeded areas shall be guaranteed to be alive and healthy as determined by the Owner at the end of Guarantee and Maintenance Period. The Guarantee and Maintenance Period shall extend for a period of one (1) full calendar year from the date of Notice of Acceptance. The Contractor shall replace, in accordance with the drawings and specifications, any area that dies, or in the opinion of the Owner, is in an unhealthy or unsightly condition throughout the Guarantee and Maintenance Period.

D. Re-seeding shall occur within the planting season following the death or rejection of any previously seeded areas. All costs incurred shall be borne by the Contractor. Seeding procedures shall comply with the requirements specified above. Newly seeded areas shall also be guaranteed to remain alive and healthy for one (1) full calendar year from time of seeding. The Guarantee and Maintenance Period for replacement seed shall begin on the date of re-seeding.

E. Inspections shall be made at the discretion of the owner during the Guarantee and Maintenance Period to determine that maintenance work is being performed in accordance with the Contract. The Contractor shall accompany the Owner on these inspections.

4.3 FINAL ACCEPTANCE

A. At the end of the Guarantee and Maintenance Period the City of Norfolk – Department of Recreation, Parks, and Open Space**,** Division of Open Space Planning and Development's Landscape Architect shall inspect all guaranteed work for Final Acceptance upon written request of the Contractor. The request shall be received at least ten (10) calendar days before the anticipated date for Final Inspection and sent to City of Norfolk - Department of Recreation, Parks, and Open Space, Division of Open Space Planning and Development, Attention: Landscape Architect.

B. If the Owner's inspection reveals that the Contractor has satisfactorily completed the requirements of all the contract documents, the Owner shall issue a Certificate of Final Acceptance.

END OF SECTION 329200

SECTION 329300 – PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants.

2. Fertilizers.
3. Topsoil and Planting soils.
4. Mulches.
5. Tree stabilization.
6. Landscape edgings.
7. Tree grates.

B. Related Sections:

1. Division 01 Section "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
2. Division 12 Section "Interior Planters and Artificial Plants" for live and artificial interior plants and planters.
3. Division 12 Section "Site Furnishings" for exterior unit planters.
4. Division 31 Section "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
5. Division 31 Section "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
6. Division 32 Section "Turf and Grasses" for turf (lawn), hydroseeding, and erosion-control materials.
7. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported,

and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

G. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

H. Finish Grade: Elevation of finished surface of planting soil.

I. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

J. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

K. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

L. Planting Area: Areas to be planted.

M. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

N. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

O. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

P. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

Q. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

R. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

S. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

T. Landscaping Substantial Completion: Inspection by the **City of Norfolk's - Department of Recreation, Parks, and Open Space, Division of Open Space Planning and Development, Landscape Architect** to ensure that all work encompassing this specification section and the contract documents is satisfactory to the City of Norfolk. This inspection will precede the awarding of the project's substantial completion.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Substitutions: Substitutions of plant materials will not be permitted unless authorized in writing by Owner or Owner's Representative. If proof is submitted that any plant specified is not obtainable by two reputable plant brokers, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. Such proof shall be substantiated and submitted in writing to Owner at least 30 days prior to start of work under this Section. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

B. Samples for Verification: For each of the following:
1. Organic Compost Mulch: 1-pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Mineral Mulch: 2 lb of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.
3. Weed Control Barrier: 12 by 12 inches.
4. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

C. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Material Test Reports: For standardized ASTM D 5268 topsoil existing native surface topsoil existing in-place surface soil and imported or manufactured topsoil. Copies of all testing results shall be submitted to the City of Norfolk's Forester, Landscape Architect, and Public Works Site Inspector.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications **STRICTLY ENFORCED**: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress. The same supervisor shall be used throughout this project unless a substitution is approved by the Owner.
4. Personnel Certifications: Installer's field supervisor personnel assigned to the Work shall have certification in all of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
    b. Certified Landscape Technician - Interior, designated CLT-Interior.
    c. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall be given soil sampling data, with depth, location, and number of samples taken to adequately represent each soil type on project site. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. All tests will be performed with the sample compacted to 30 foot pounds at 40 cm. moisture tension where applicable.
4. Report suitability of tested soil for turf growth.

    a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
5. If soil testing does not meet particle size distribution, physical and/or chemical properties specified; the soil shall be adjusted and re-tested, or another source secured, tested, and submitted for approval.
6. All testing will be at the expense of the contractor.

D. Percolation Test: Submit a soil percolation test report for each 200 cubic yards of proposed new planting soil, or existing stockpiled planting soil, certifying that proposed soil has a proper water absorption rate.
1. Dig a rectangular pit 12” square by 18” deep and rapidly pour water to a depth of 6” (approximately 3 ¾ gallons). Note time required for water to be completely absorbed.
2. Test holes to be dug randomly within planting locations indicated on plans to ensure areas tested specifically correlate to proposed plantings.
3. Proposed planting soils having a water absorption rate faster than 18 minutes, or slower than 30 minutes, are not acceptable.

E. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1. Contractor shall keep a copy of ANSI regulation on site while installing all plant materials.

1. Selection of plants purchased under allowances will be made by Owner, who will tag plants at their place of growth before they are prepared for transplanting.

F. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

G. Plant Material Observation: Owner may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Owner retains right to observe trees and shrubs further for size and condition of balls and root systems, growth habit, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.

H. **Mandatory** pre-installation Conference: **Must conduct landscape pre-installation conference at Project site, include Public Works Site Inspector and designated City Landscape Architect**.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

G. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Existing Utilities: **Contractor is responsible for calling Miss Utility.**

B. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

C. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Landscape Architect Construction Manager and Owner no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Owner's written permission.

D. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. All ball and burlap plant material shall be installed from October 15 to March 31, unless otherwise authorized by the Department of Recreation, Parks and Open Space.
2. All container grown plant material shall be installed from September 15 to May 15, unless otherwise authorized by the Department of Recreation, Parks and Open Space.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

F. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Death and unsatisfactory growth, except for defects resulting from abuse, or neglect by Owner, or incidents that are beyond Contractor's control.
    b. Structural failures including plantings falling or blowing over.
    c. Faulty performance of tree stabilization edgings.
    d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of **Landscaping Substantial Completion**:

    a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
    b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
    c. Contractor shall be responsible for complete and proper planting supports, installation layout, watering, fertilizing, and pest and pathogen control during warranty period.
    d. **Contractor shall be responsible for watering of installed materials during the warranty period of one year. Contractor shall be responsible for securing appropriate water source, providing the water and all associated equipment for watering at the contractor's expense.**

3. Include the following remedial actions as a minimum:

    a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
    b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
    c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

    1. Maintenance Period: Maintain until **Final Acceptance**.

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

    1. Maintenance Period: Maintain until **Final Acceptance**.

C. Initial Maintenance Service for Mulching and Weeding: Provide maintenance by skilled employees of landscape Installer. Maintain mulch depth and removal of weeds as required in Part 3. Begin maintenance immediately after beds are installed and continue until **Landscaping Substantial Completion** is awarded by City of Norfolk – Department of Recreation, Parks, and

Open Space's Landscape Architect and Parks and Forestry Department accepts the project for **Landscaping Substantial Completion** but for not less than maintenance period below.

1. Maintenance Period: Maintain until **Final Acceptance**.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Owner, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 sieve and a minimum of 75 percent passing through No. 60 sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
3. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

E. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

F. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

2.5 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Topsoil by Volume: 1:4.
2. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
3. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
4. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
5. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.

7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
8. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
9. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

B. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with another specified planting soil when quantities are insufficient.
2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

    a. Ratio of Loose Compost to Topsoil by Volume: 1:2.
    b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
    c. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
    d. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
    e. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
    f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
    g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
    h. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
    i. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
    j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
    k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

C. Planting Soil: Existing, in-place surface soil. Verify suitability of existing surface soil to produce viable planting soil. Remove stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Surface Soil by Volume: 1:2.
2. Ratio of Loose Sphagnum Peat to Surface Soil by Volume: per soil test recommendations.
3. Ratio of Loose Wood Derivatives to Surface Soil by Volume: per soil test recommendations.
4. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
5. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
6. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
7. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
8. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
9. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.

10. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
11. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

D. Planting Soil: Imported topsoil or manufactured topsoil from off-site sources. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from agricultural land, bogs, or marshes.

1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

    a. Ratio of Loose Compost to Topsoil by Volume: 1:2.
    b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: per soil test recommendations.
    c. Ratio of Loose Wood Derivatives to Topsoil by Volume: per soil test recommendations.
    d. Weight of Lime per 1000 Sq. Ft.: per soil test recommendations.
    e. Weight of Sulfur Iron Sulfate Aluminum Sulfate per 1000 Sq. Ft.: per soil test recommendations.
    f. Weight of Agricultural Gypsum per 1000 Sq. Ft.: per soil test recommendations.
    g. Volume of Sand Plus 10 Percent Diatomaceous Earth per 1000 Sq. Ft.: per soil test recommendations.
    h. Weight of Bonemeal per 1000 Sq. Ft.: per soil test recommendations.
    i. Weight of Superphosphate per 1000 Sq. Ft.: per soil test recommendations.
    j. Weight of Commercial Fertilizer per 1000 Sq. Ft.: per soil test recommendations.
    k. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: per soil test recommendations.

2.6 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following (Triple Shredded Hardwood unless otherwise noted on construction drawings):

1. Type: Triple Shredded hardwood and Pine needles.
2. Size Range: 3 inches maximum, 1/2 inch minimum.
3. Color: Natural.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble

salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:

1. Type: Rounded riverbed gravel or smooth-faced stone.
2. Size Range: 2-4 inches.
3. Color: Black.

2.7 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd..

2.8 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.

4. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch in diameter.
5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
6. Guy Cables: Five-strand, 3/16-inch- diameter, galvanized-steel cable, with zinc-coated turnbuckles, a minimum of 3 inches long, with two 3/8-inch galvanized eyebolts.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.
8. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.
3. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.

2.10 LANDSCAPE EDGINGS

A. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Edging Size: 3/8 inch wide by 6 inches deep.
2. Stakes: Tapered steel, a minimum of 12 inches long.
3. Accessories: Standard tapered ends, corners, and splicers.
4. Finish: Standard paint.
5. Paint Color: Black.

2.11 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

B. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils thick, with vertical root deflecting ribs protruding 3/4 inch out from panel, and each panel 18 inches wide.

C. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

D. Burlap: Non-synthetic, biodegradable.

E. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.

F. Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

G. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Refer to construction documents for specific requirements on amending soils in place or excavation and replacement in preparing all planting beds (Contact Department of Recreation, Parks & Open Space / Open Space Planning and Development if construction documents do not specify requirements).

D. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Owner's acceptance of layout before excavating or planting. Make minor adjustments as required.

E. Lay out plants at locations directed by Owner. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT – SMALL SHRUBS AND GROUND COVERS

A. Small Shrubs and ground covers: plants that have a maturity height of 5’-0” or less.

B. Amend in place to create specified planting soil or excavate and replace with planting soil for planting areas to a minimum depth of 8 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. When amending topsoil to planting soil; apply one-half of the amendments directly to planting area before loosening, till areas then apply the other half and till areas again until thoroughly blended into the planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.
   c. Do not place amendments or till planting areas if planting soil or subgrade is frozen, muddy, or excessively wet.

2. When replacing soil and importing planting soil; thoroughly blend planting soil off-site before spreading or spread topsoil, apply one-half soil amendments and fertilizer on surface, till areas and then apply the other half and till areas again until thoroughly blended into the planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.
   c. Spread planting soil to a depth of 8 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   d. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

D. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

E. Application of Mycorrhizal Fungi: At time directed by Owner, broadcast dry product uniformly over prepared soil at per soil test recommendations.

3.4 PLANTING AREA ESTABLISHMENT (LARGE SHRUB AND SMALL TREE BEDS)

A. Large Shrubs and Small Trees: plants that have a maturity height above 5’-0” and below 25’-0”.

B. Amend in place to create specified planting soil or excavate and replace with planting soil for planting areas to a minimum depth of 12 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. When amending topsoil to planting soil; apply one-half of the amendments directly to planting area before loosening, till areas then apply the other half and till areas again until thoroughly blended into the planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.
   c. Do not place amendments or till planting areas if planting soil or subgrade is frozen, muddy, or excessively wet.

2. When replacing soil and importing planting soil; thoroughly blend planting soil off-site before spreading or spread topsoil, apply one-half soil amendments and fertilizer on surface, till areas and then apply the other half and till areas again until thoroughly blended into the planting soil.
   a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
   b. Mix lime with dry soil before mixing fertilizer.
   c. Spread planting soil to a depth of 12 inches but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   d. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

D. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

E. Application of Mycorrhizal Fungi: At time directed by Owner, broadcast dry product uniformly over prepared soil at per soil test recommendations.

3.5 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away

from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped container-grown stock.
2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
8. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Owner if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Owner if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.6 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.

1. Use planting soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove

from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.

3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Set fabric bag-grown stock plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Set and support bare-root stock in center of planting pit or trench with root flare 1 inch above adjacent finish grade.

1. Use planting soil for backfill.
2. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
3. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about 1 inch from root tips; do not place tablets in bottom of the hole or touching the roots.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.7 MECHANIZED TREE SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in the same direction as in its original location.

3.8 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Owner.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Owner, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.9 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend to the dimension shown on Drawings above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

2. Use two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Staking and Guying: Stake and guy trees more than 14 feet in height and more than 3 inches in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes 30 inches long, driven to grade.

1. Site-Fabricated Staking-and-Guying Method:

   a. For trees more than 6 inches in caliper, anchor guys to wood deadmen buried at least 36 inches below grade. Provide turnbuckle for each guy wire and tighten securely.
   b. Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
   c. Support trees with strands of cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle. Allow enough slack to avoid rigid restraint of tree.
   d. Attach flags to each guy wire, 30 inches above finish grade.
   e. Paint turnbuckles with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

C. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.

1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

   a. Install stakes of length required to penetrate at least to the dimension shown on Drawings below bottom of backfilled excavation. Saw stakes off at horizontal stake.
   b. Install screws through horizontal hold-down and penetrating at least 1 inch into stakes. Predrill holes if necessary to prevent splitting wood.
   c. Install second set of stakes on other side of root trunk for larger trees as indicated.

2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

D. Palm Bracing: Install bracing system at three or more places equally spaced around perimeter of trunk to secure each palm until established unless otherwise indicated.

1. Site-Fabricated Palm-Bracing Method:

    a. Place battens over padding and secure battens in place around trunk perimeter with at least two straps, tightened to prevent displacement. Ensure that straps do not contact trunk.
    b. Place diagonal braces and cut to length. Secure upper ends of diagonal braces with galvanized nails into battens or into nail-attached blocks on battens. Do not drive nails, screws, or other securing devices into palm trunk; do not penetrate palm trunk in any fashion. Secure lower ends of diagonal braces with stakes driven into ground to prevent outward slippage of braces.

2. Proprietary Palm-Bracing Device: Install palm-bracing system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.10 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.11 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 6 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Tree-like Shrubs in Turf Areas: Apply organic mulch ring of 2-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 6 inches of trunks or stems.
2. Organic Mulch in Planting Areas: Apply 2-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.12 EDGING INSTALLATION

A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches apart, driven below top elevation of edging.

B. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, 4- to 6-inch- deep, shovel-cut edge as shown on Drawings.

3.13 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Replenish mulch as necessary to maintain depths shown within the planting details and specifications.

D. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.14 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.15 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.16 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

PART 4 - INSPECTION AND ACCEPTANCE

4.1 LANDSCAPING SUBSTANTIAL COMPLETION

A. The contractor shall perform all necessary weeding, watering, mowing, trimming, and shall replace plants that are dead, not healthy, misshaped, or otherwise damaged.

B. City of Norfolk – Department of Recreation, Parks, and Open Space's Landscape Architect shall inspect all work and materials for **Landscaping Substantial Completion** upon written request by the Contractor. The request shall be received at least ten (10) calendar days before the anticipated date of inspection and sent to City of Norfolk – Department of Recreation, Parks, and Open Space's Landscape Architect.

C. Upon correction and/or replacement of all substandard work and materials by the Contractor, the Owner shall issue a certificate of **Landscaping Substantial Completion**. The responsibility for obtaining the Certificate of **Landscaping Substantial Completion**, as well as obtaining the subsequent overall **Project Substantial Completion** rests with the Contractor. Progress payments may be withheld unless the Contractor obtains the **Certificate of Project Substantial Completion**.

D. The work may be accepted in parts when it is deemed to be in the City's best interest to do so, and when written approval is given to the Contractor to incrementally complete the work. Acceptance and use of such areas by the Owner shall not waive any of the provisions of this Contract.

4.2 LANDSCAPING INSPECTION, GUARANTEE AND REPLACEMENT

A. Landscaping Inspection: Inspection of the work to determine its completion for beginning of the Landscaping Guarantee and Maintenance Period will be made by the Owner upon request for such inspection submitted by the Contractor at least (10) days prior to the anticipated date. ALL PLANTS MUST BE ALIVE AND HEALTHY.

B. After inspection, the Owner will notify the Contractor of the date to begin the Landscaping Guarantee and Maintenance Period by issuing a Notice of Acceptance, or in the event of any deficiencies, of the requirements for beginning the Landscaping Guarantee and Maintenance Period.

1. Landscaping Guarantee and Replacement: Warranty Periods from Date of **Project Substantial Completion**:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

C. Inspections shall be made at the discretion of the owner during the Landscaping Guarantee and Maintenance Period to determine that maintenance work is being performed in accordance with the Contract. The Contractor shall accompany the Owner on these inspections.

4.3 LANDSCAPING FINAL ACCEPTANCE

A. At the end of the Landscaping Guarantee and Maintenance Period the City of Norfolk – Department of Recreation, Parks, and Open Space's Landscape Architect shall inspect all guaranteed work for Final Acceptance upon written request of the Contractor. The request shall be received at least ten (10) calendar days before the anticipated date for Final Inspection and sent to City of Norfolk - Department of Recreation, Parks, and Open Space, Attention, Landscape Architect.

B. If the Owner's inspection reveals that the Contractor has satisfactorily completed the requirements of all the contract documents, the Owner shall issue a Certificate of Final Acceptance.

END OF SECTION 329300

WITSMAN ASSOCIATES, PLC
Professionals in Geotechnical Engineering

April 28, 2016

Mr. Elmer Tolle
Blakeway Corporation
700 Independence Circle
Suite 100
Virginia Beach, Virginia 23455

e-mail: elmer_tolle@blakewaycorp.com

Subject: Pavement Coring Observations
2000 Block & 2400 Block of Lafayette Boulevard
Norfolk, Virginia
Witsman Associates Project No. 1002.48

Dear Elmer,

At your request, we performed two pavement cores, one in the 2000 block of Lafayette Boulevard, and the other in the 2400 block of Lafayette Boulevard in Norfolk, Virginia. The purpose of the cores was to provide general information regarding pavement types and pavement thickness encountered along this stretch of Lafayette Boulevard, east of the intersection with Tidewater Drive. We performed the pavement cores on April 28, 2016 at two locations selected by Blakeway Corp. The cores were terminated upon encountering the aggregate base course materials. A hand auger probe was the performed through the core hole to identify the underlying subgrade soils to a depth of about 4 feet below the pavement surface.

Lafayette Boulevard is a four lane roadway. Pavement Core PC-1 was performed within the left lane of eastbound Lafayette Boulevard, across from the Tinee Giant Convenience Store at 2001 Lafayette Boulevard. Pavement Core C-2 was performed within a small center island delineated by yellow lines between the eastbound and westbound lanes across from a pawn shop at 2417 Lafayette Boulevard. Our visual classifications of the pavement thickness and the soils encountered to the depth of about 4 feet in the hand auger probes are shown below:

Pavement Core and Hand Auger PC-1 (2001 Lafayette Boulevard)

0” to 3-1/4”	Asphalt Pavement
3-1/4” to 10”	Aggregate Base Course – Crushed stone up to 3” in size with sand matrix
10” to 18”	Silty Fine to Medium Sand FILL (SP-SM/FILL), contains washed gravel, moist, black
18” to 42”	SILTY CLAY (CL), trace sand, moist, gray
42” to 48”	Clayey SAND (SC), moist, gray with orange-brown

Pavement Core and Hand Auger PC-2 (2417 Lafayette Boulevard)

0" to 4-1/2"	Asphalt Pavement
4-1/2" to 12"	Aggregate Base Course – Crushed stone up to 3" in size with sand matrix
12" to 18"	Silty Fine to Medium Sand FILL (SP-SM/FILL), contains washed gravel, moist, black
18" to 42"	SILTY CLAY (CL), trace sand, moist, brown with orange-brown
42" to 48"	Clayey SAND (SC), moist, brown with orange-brown

Groundwater was not encountered during drilling of the hand auger probes. Black fill soils were encountered underlying the pavement section to a depth of about 18 inches.

LIMITATIONS

This field exploration report is for the exclusive use of the **City of Norfolk** and **Blakeway Corporation** as the designers of the project described herein, and may only be applied to this specific project. Our services have been performed using generally accepted standards of Geotechnical Engineering practice in the Commonwealth of Virginia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

The right to rely upon this letter and the data within may not be assigned without the written permission of **Witsman Associates, PLC**. The data obtained from the cores do not reflect variations in subsurface conditions that may exist intermediate of our coring locations and in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate conditions based upon "on-site" observations of the conditions.

Please contact me if you have any questions regarding this field exploration program.

Sincerely,

WITSMAN ASSOCIATES, PLC

Gary R. Witsman, P.E.
President

C: 1002.48_Lafayette Blvd Pavement Cores.docx

ADDENDUM 2

Google earth

feet 1000

meters 400

APPENDIX II

BORING LOGS

GET Solutions, Inc.
Geotechnical • Environmental • Testing

BORING LOG
CBR-1

PROJECT: Lafayette Blvd. West Reconstruction ~~ADDENDUM 2~~
CLIENT: Woolpert, Inc.
PROJECT LOCATION: Norfolk, VA **PROJECT NO.:** VB13-204G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc **LOGGED BY:** E. Alshoufy, E.I.T.
DRILLING METHOD: Hollow Stem Auger **DATE:** 6-14-13
DEPTH TO WATER - INITIAL*: ▽ 4' **AFTER 24 HOURS:** ▼ ___ **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	5" Asphalt							
			0.4 12" Concrete		1	6	SS	- - - 5	5	21.3
			1.4 Grayish-Brown, moist, Silty fine to medium SAND (SM) with trace fine Gravel, loose "fill"							
	0.8	2	2 Tan, moist, Poorly graded fine to medium SAND (SP-SM) with Silt and Clay nodules, loose		2	20	SS	3 4 2 3	6	
		4 ▽	4 Orange, wet, Poorly graded fine to medium SAND (SM), loose		3	18	SS	2 2 3 4	5	
	1.6	6	6 Tan, wet, Poorly graded fine to medium SAND (SP-SM) with Silt, medium dense		4	24	SS	7 7 5 8	12	
	2.4	8	8 Orange/Gray, wet, Poorly graded fine to medium SAND (SP-SM) with Silt, loose		5	24	SS	2 3 4 6	6	
		10	Boring terminated at 10 ft.							
	3.2									
		12								
	4									
		14								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

**The initial groundwater reading may not be indicative of the static groundwater level.*

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

GET Solutions, Inc.
Geotechnical • Environmental • Testing

BORING LOG CBR-2

PROJECT: Lafayette Blvd. West Reconstruction ~~ADDENDUM 2~~
CLIENT: Woolpert, Inc.
PROJECT LOCATION: Norfolk, VA **PROJECT NO.:** VB13-204G
BORING LOCATION: See Attached Boring Location Plan **SURFACE ELEVATION:**
DRILLER: GET Solutions, Inc **LOGGED BY:** E. Alshoufy, E.I.T.
DRILLING METHOD: Hollow Stem Auger **DATE:** 6-14-13
DEPTH TO WATER - INITIAL*: ▽ 6' **AFTER 24 HOURS:** ▽ **CAVING>** C

Elevation (MSL) (ft)	Depth (meters)	Depth (feet)	Description	Graphic	Sample No.	Sample Recovery	Sample Type	Blows per 6"	N-Value	% < #200
	0	0	2.5" Asphalt (0.2)							
			7" Aggregate Base Material (0.79)							
			Grayish-Brown, moist, Sandy Silty CLAY (CL-ML) with trace fine Gravel, very stiff "fill"		1	4	SS	24 12 4 2	16	51.9
		2	(2)							
	0.8		Mottled Gray to Orange, moist, Silty fine to medium SAND (SM), loose		2	24	SS	2 2 3 4	5	
		4			3	24	SS	4 6 8 9	14	
	1.6		(5.5)							
		6 ▽	Gray, moist, Poorly graded fine to medium SAND (SP-SM) with Silt, medium dense (6)							
			Gray, wet, Poorly graded fine to medium SAND (SP), medium dense		4	24	SS	9 11 13 13	24	
	2.4	8								
					5	24	SS	5 4 7 9	11	
		10	Boring terminated at 10 ft.							
	3.2									
		12								
	4									
		14								

TEST RESULTS
Plastic Limit ⊢ Liquid Limit
Moisture Content - ●
N-Value - ▨
10 20 30 40 50 60 70

This information pertains only to this boring and should not be interpreted as being indicitive of the site.

Notes:

**The initial groundwater reading may not be indicative of the static groundwater level.*

SS = Split Spoon Sample
ST = Shelby Tube Sample
HA = Hand Auger Sample
BS = Bulk Sample
WOH = Weight of Hammer

Standard Penetration Tests were performed in the field in general accordance with ASTM D 1586.

KEY TO SYMBOLS

ADDENDUM 2

Symbol Description

Strata symbols

Paving

Concrete

Fill

Poorly graded Sand with Silt

Silty Sand

Poorly graded Sand

Aggregate Base Material

Misc. Symbols

Water table during drilling

Notes:

1. **Exploratory borings were drilled on 6-14-13 using a 4-inch diameter continuous flight power auger.**

2. **No free water was encountered at the time of drilling or when re-checked the following day.**

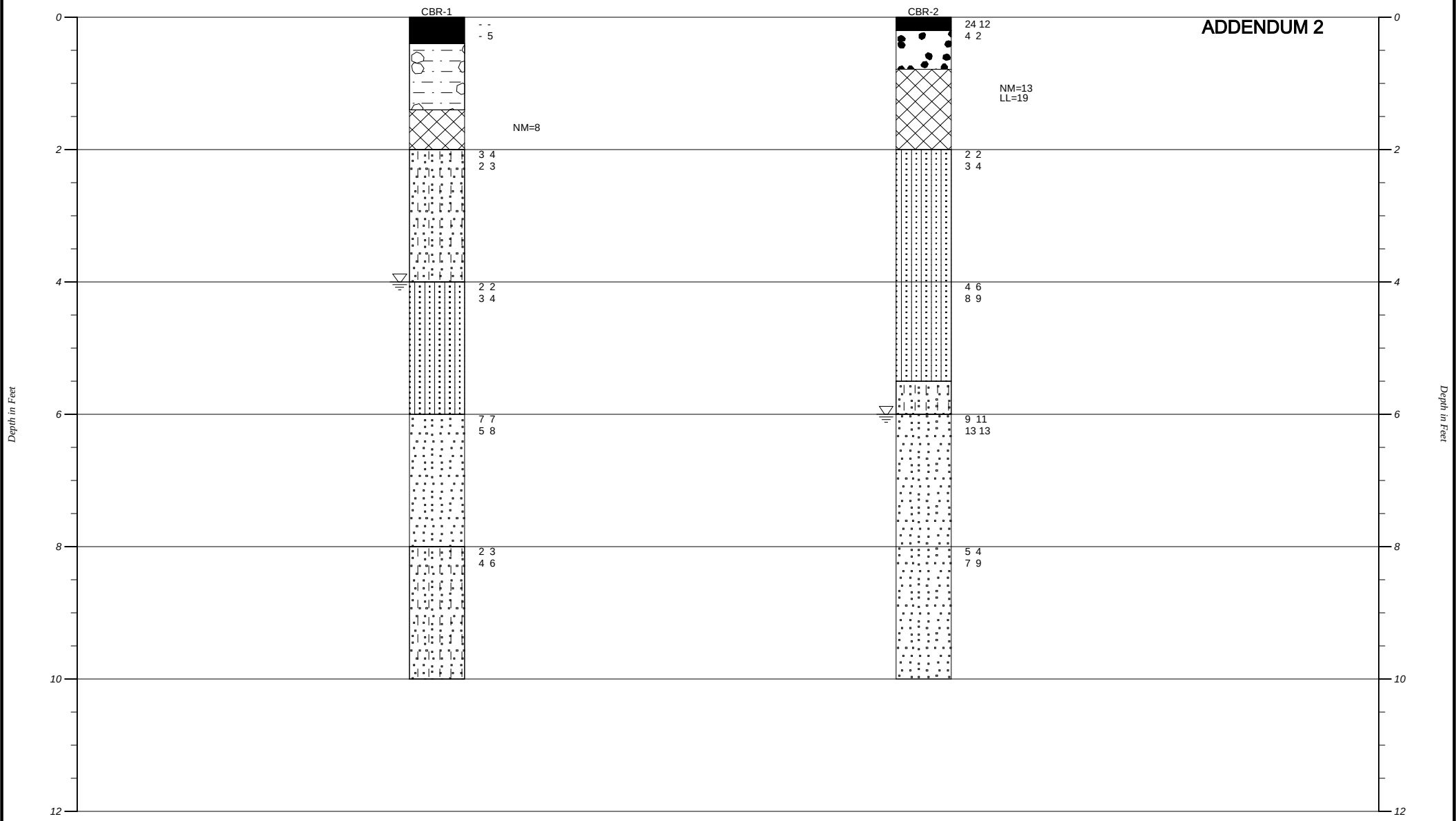
3. **Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.**

4. **These logs are subject to the limitations, conclusions, and recommendations in this report.**

5. **Results of tests conducted on samples recovered are reported on the logs.**

APPENDIX III

GENERALIZED SOIL PROFILE



Strata symbols

- Paving
- Concrete
- Fill
- Poorly graded Sand with Silt
- Silty Sand
- Poorly graded Sand
- Aggregate Base Material

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GENERALIZED SOIL PROFILE

HORIZONTAL SCALE:	DRAWN BY/APPROVED BY	DATE DRAWN
VERTICAL SCALE: 1"=2'		7/26/2013

Lafayette Blvd. West Reconstruction

PROJECT NO. VB13-204G

FIGURE NUMBER